



# **STIC Search Report**

## **Biotech-Chem Library**

**STIC Database Tracking Number: 158020**

**TO: Ben Sackey**  
**Location: 5b31 / 5c18**  
**Tuesday, July 19, 2005**  
**Art Unit: 1626**  
**Phone: 571-272-0704**  
**Serial Number: 10 / 676884**

**From: Jan Delaval**  
**Location: Biotech-Chem Library**  
**Remsen 1a51**  
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### **Search Notes**

## SEARCH REQUEST FORM

Scientific and Technical Information Center

158020

Requester's Full Name: BEN JACKSON Examiner #: 72489 Date: 6/30/05  
 Art Unit: 1626 Phone Number 302-0704 Serial Number: 10/676,884  
 Mail Box and Bldg/Room Location: REM 5B31 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Hydrothermally Synthesized MO-V-M-Nb-X oxide catalyst  
 Inventors (please provide full names): Gaffney et al.

Earliest Priority Filing Date: \_\_\_\_\_

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

A process for producing a catalyst of formula:

$MO_9V_6M_cNb_4X_eO_f$ ; comprising admixing compds of  $MO, V, M, Nb$

and X and solvent comprising  $H_2O$  to form a first admixture

containing at least 2, but less than all of  $MO, V, M, Nb$ , and X

② heating the first admix at a temperature of  $25^\circ C$  to  $200^\circ C$  for 5 mins ~~to~~ 48 hours

③ then admixing  $MO, V, M, Nb$ , and X with the first admixture to form a 2nd admixture

④ heating 2nd admixture at a temperature of  $50^\circ C$  to  $300^\circ C$  for 1 hour to several weeks in a closed vessel under pressure.

⑤ recovering insoluble material from closed vessel to obtain catalyst.  
 claim 2 and 7.

=> d his

(FILE 'HOME' ENTERED AT 13:34:26 ON 19 JUL 2005)  
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 13:34:33 ON 19 JUL 2005

L1 1 S US20040063990/PN OR (US2003-676334# OR US2002-415288#)/AP,PRN  
E GAFFNEY A/AU  
L2 110 S E3,E4,E10,E11,E14,E15  
E SONG R/AU  
L3 65 S E3-E9  
E SONG RUO/AU  
L4 25 S E3,E10  
L5 8568 S ((ROHM? OR ROEHM?) (L)HAAS?)/PA,CS  
L6 51 S L2-L4 AND CATALY?/SC,SX  
L7 94 S L2-L4 AND CATALY?/CW,CT  
L8 91 S L2-L4 AND CAT/RL  
L9 108 S L6-L8  
L10 1 S L1 AND L2-L9  
SEL RN

FILE 'REGISTRY' ENTERED AT 13:38:38 ON 19 JUL 2005

L11 46 S E1-E46  
L12 26 S L11 NOT TIS/CI  
L13 20 S L11 NOT L12  
L14 156 S (MO AND V AND NB AND O)/ELS AND (TE OR SB)/ELS  
L15 75 S L14 AND 6/ELC.SUB  
L16 125 S L14 AND (LI OR NA OR K OR RB OR CS OR MG OR CA OR SR OR BA OR  
L17 33 S L14 AND (BI OR SE OR F OR CL OR BR OR I OR PR OR ND OR SM OR  
L18 135 S L16,L17  
L19 63 S L18 AND L15  
L20 20 S L13 AND L19  
L21 43 S L19 NOT L20  
L22 25 S L21 AND SB/ELS  
L23 4 S L22 AND (TL OR GE OR AL OR SN)/ELS  
L24 21 S L22 NOT L23  
L25 18 S L21 NOT L22  
L26 59 S L20,L24,L25  
L27 76 S L18 NOT L26  
SAV L26 SACKY676/A

FILE 'HCAOLD' ENTERED AT 14:14:48 ON 19 JUL 2005

L28 0 S L26

FILE 'HCAPLUS' ENTERED AT 14:14:53 ON 19 JUL 2005

L29 51 S L26  
L30 28 S L26 (L) PREP+NT/RL  
L31 11 S L1-L10 AND L30  
L32 46 S L29 AND (PD<=20021001 OR PRD<=20021001 OR AD<=20021001)  
L33 26 S L30 AND L32  
L34 10 S L31 AND L32  
L35 1 S L31 NOT L34  
L36 11 S L31,L34,L35  
L37 27 S L33,L36  
L38 20 S L32 NOT L37

FILE 'USPATFULL' ENTERED AT 14:20:33 ON 19 JUL 2005

L39 44 S L26  
L40 0 S L39 AND B01J037/IPC  
L41 32 S L39 AND B01J/IPC

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L42      41 S L39 AND (PD<=20021001 OR PRD<=20021001 OR AD<=20021001)
L43      19 S L39 AND (GAFFNEY ? OR SONG ?)/AU
L44      3 S L39 AND (ROHM? OR ROEHM?)/PA
L45      29 S L41 AND L42
L46      31 S L43,L44,L45
L47      13 S L39,L42 NOT L46

```

=> fil reg

FILE 'REGISTRY' ENTERED AT 14:23:31 ON 19 JUL 2005  
 USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.  
 PLEASE SEE "HELP USAGETERMS" FOR DETAILS.  
 COPYRIGHT (C) 2005 American Chemical Society (ACS)

Property values tagged with IC are from the ZIC/VINITI data file  
 provided by InfoChem.

STRUCTURE FILE UPDATES: 18 JUL 2005 HIGHEST RN 855828-45-4  
 DICTIONARY FILE UPDATES: 18 JUL 2005 HIGHEST RN 855828-45-4

New CAS Information Use Policies, enter HELP USAGETERMS for details.

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 18, 2005

Please note that search-term pricing does apply when  
 conducting SmartSELECT searches.

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*****
*
* The CA roles and document type information have been removed from *
* the IDE default display format and the ED field has been added, *
* effective March 20, 2005. A new display format, IDERL, is now *
* available and contains the CA role and document type information. *
*
*****

```

Structure search iteration limits have been increased. See HELP SLIMITS  
 for details.

Experimental and calculated property data are now available. For more  
 information enter HELP PROP at an arrow prompt in the file or refer  
 to the file summary sheet on the web at:  
<http://www.cas.org/ONLINE/DBSS/registryss.html>

=> d ide can tot 126

```

L26 ANSWER 1 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN
RN 766557-27-1 REGISTRY
ED Entered STN: 21 Oct 2004
CN Antimony molybdenum niobium silver vanadium oxide (9CI) (CA INDEX NAME)
MF Ag . Mo . Nb . O . Sb . V
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

```

Component	Ratio	Component Registry Number
O	x	17778-80-2
V	x	7440-62-2
Sb	x	7440-36-0

Ag	x	7440-22-4
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:314762

L26 ANSWER 2 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 676365-89-2 REGISTRY  
ED Entered STN: 21 Apr 2004  
CN Chromium molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF Cr . Mo . Nb . O . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Cr	x	7440-47-3
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

L26 ANSWER 3 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 676365-88-1 REGISTRY  
ED Entered STN: 21 Apr 2004  
CN Calcium molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF Ca . Mo . Nb . O . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
Ca	x	7440-70-2
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

L26 ANSWER 4 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 676365-87-0 REGISTRY

ED Entered STN: 21 Apr 2004  
 CN Molybdenum niobium potassium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF K . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
K	x	7440-09-7
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

L26 ANSWER 5 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 676365-86-9 REGISTRY  
 ED Entered STN: 21 Apr 2004  
 CN Lithium molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Li . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7
Li	x	7439-93-2

1 REFERENCES IN FILE CA (1907 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

L26 ANSWER 6 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 676365-85-8 REGISTRY  
 ED Entered STN: 21 Apr 2004  
 CN Molybdenum niobium rhodium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Rh . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2

Te	x	13494-80-9
V	x	7440-62-2
Rh	x	7440-16-6
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

L26 ANSWER 7 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN **676365-84-7** REGISTRY  
ED Entered STN: 21 Apr 2004  
CN Molybdenum niobium platinum tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF **Mo . Nb . O . Pt . Te . V**  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Pt	x	7440-06-4
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

L26 ANSWER 8 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN **675571-72-9** REGISTRY  
ED Entered STN: 15 Apr 2004  
CN Lead molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF **Mo . Nb . O . Pb . Te . V**  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, CASREACT, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7
Pb	x	7439-92-1

2 REFERENCES IN FILE CA (1907 TO DATE)  
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 140:289191

L26 ANSWER 9 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 511313-29-4 REGISTRY  
 ED Entered STN: 06 May 2003  
 CN Antimony gold molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
 MF **Au . Mo . Nb . O . Sb . V**  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
V	x	7440-62-2
Au	x	7440-57-5
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:314762

REFERENCE 2: 138:323030

L26 ANSWER 10 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 420134-66-3 REGISTRY  
 ED Entered STN: 22 May 2002  
 CN Molybdenum niobium selenium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF **Mo . Nb . O . Se . Te . V**  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
Se	x	7782-49-2
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:355590

L26 ANSWER 11 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 406681-68-3 REGISTRY  
 ED Entered STN: 23 Apr 2002  
 CN Gold molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF **Au . Mo . Nb . O . Te . V**  
 CI TIS  
 SR CA



LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Au	x	7440-57-5
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279833

L26 ANSWER 12 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 406681-67-2 REGISTRY

ED Entered STN: 23 Apr 2002

CN Molybdenum niobium silver tellurium vanadium oxide (9CI) (CA INDEX NAME)

MF Ag . Mo . Nb . O . Te . V

CI TIS

SR CA

LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Ag	x	7440-22-4
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279833

L26 ANSWER 13 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 406681-66-1 REGISTRY

ED Entered STN: 23 Apr 2002

CN Copper molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)

MF Cu . Mo . Nb . O . Te . V

CI TIS

SR CA

LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Cu	x	7440-50-8
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 138:122955

REFERENCE 2: 136:279833

L26 ANSWER 14 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 406675-88-5 REGISTRY  
ED Entered STN: 23 Apr 2002  
CN Molybdenum niobium rhenium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF Mo . Nb . O . Re . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Re	x	7440-15-5
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279830

L26 ANSWER 15 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 406675-87-4 REGISTRY  
ED Entered STN: 23 Apr 2002  
CN Indium molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF In . Mo . Nb . O . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
In	x	7440-74-6
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

3 REFERENCES IN FILE CA (1907 TO DATE)  
3 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 139:36960

REFERENCE 3: 136:279830

L26 ANSWER 16 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 406675-82-9 REGISTRY  
 ED Entered STN: 23 Apr 2002  
 CN Molybdenum niobium tellurium vanadium iodide oxide (9CI) (CA INDEX NAME)  
 MF I . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
I	x	14362-44-8
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 136:279831

L26 ANSWER 17 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 406675-81-8 REGISTRY  
 ED Entered STN: 23 Apr 2002  
 CN Molybdenum niobium tellurium vanadium fluoride oxide (9CI) (CA INDEX NAME)  
 MF F . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
F	x	14762-94-8
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279831

L26 ANSWER 18 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 406675-80-7 REGISTRY  
 ED Entered STN: 23 Apr 2002  
 CN Molybdenum niobium tellurium vanadium chloride oxide (9CI) (CA INDEX NAME)  
 MF Cl . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
Cl	x	22537-15-1
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)

2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 136:279831

L26 ANSWER 19 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 406675-79-4 REGISTRY

ED Entered STN: 23 Apr 2002

CN Molybdenum niobium tellurium vanadium bromide oxide (9CI) (CA INDEX NAME)

MF Br . Mo . Nb . O . Te . V

CI TIS

SR CA

LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
Br	x	10097-32-2
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)

2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 136:279831

L26 ANSWER 20 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 406675-66-9 REGISTRY

ED Entered STN: 23 Apr 2002

CN Iridium molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)

MF Ir . Mo . Nb . O . Te . V

CI TIS

SR CA

LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

Ir | x | 7439-88-5

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279832

L26 ANSWER 21 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 406675-58-9 REGISTRY  
ED Entered STN: 23 Apr 2002  
CN Molybdenum niobium tellurium vanadium yttrium oxide (9CI) (CA INDEX NAME)  
MF Mo . Nb . O . Te . V . Y  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
Y	x	7440-65-5
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279834

L26 ANSWER 22 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 406675-50-1 REGISTRY  
ED Entered STN: 23 Apr 2002  
CN Gallium molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF Ga . Mo . Nb . O . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Ga	x	7440-55-3
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279829

L26 ANSWER 23 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 406675-48-7 REGISTRY  
ED Entered STN: 23 Apr 2002  
CN Molybdenum niobium tellurium vanadium zinc oxide (9CI) (CA INDEX NAME)  
MF Mo . Nb . O . Te . V . Zn

CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
Zn	x	7440-66-6
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 136:279829

L26 ANSWER 24 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 380413-74-1 REGISTRY  
 ED Entered STN: 04 Jan 2002  
 CN Molybdenum niobium tellurium titanium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Te . Ti . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Ti	x	7440-32-6
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 137:79353

REFERENCE 2: 136:38031

L26 ANSWER 25 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 380413-67-2 REGISTRY  
 ED Entered STN: 04 Jan 2002  
 CN Antimony molybdenum niobium titanium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Sb . Ti . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====

O	x	17778-80-2
V	x	7440-62-2
Sb	x	7440-36-0
Ti	x	7440-32-6
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)

2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 137:79353

REFERENCE 2: 136:38031

L26 ANSWER 26 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 363610-76-8 REGISTRY

ED Entered STN: 22 Oct 2001

CN Antimony boron molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)

MF B . Mo . Nb . O . Sb . V

CI TIS

SR CA

LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
O	x	17778-80-2
V	x	7440-62-2
B	x	7440-42-8
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 135:278674

L26 ANSWER 27 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 347143-00-4 REGISTRY

ED Entered STN: 20 Jul 2001

CN Hafnium alloy, nonbase, Hf,Mo,Nb,O,Sb,V (9CI) (CA INDEX NAME)

MF Hf . Mo . Nb . O . Sb . V

CI AYS

SR CA

LC STN Files: CA, CAPLUS

Component	Component Registry Number
Hf	7440-58-6
Mo	7439-98-7
Nb	7440-03-1
O	17778-80-2
Sb	7440-36-0
V	7440-62-2

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 135:77251

L26 ANSWER 28 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 347142-99-8 REGISTRY  
 ED Entered STN: 20 Jul 2001  
 CN Molybdenum alloy, nonbase, Mo,Nb,O,Re,Sb,V (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Re . Sb . V  
 CI AYS  
 SR CA  
 LC STN Files: CA, CAPLUS

Component Component  
 Registry Number

```
=====+=====
Mo      7439-98-7
Nb      7440-03-1
O       17778-80-2
Re      7440-15-5
Sb      7440-36-0
V       7440-62-2
```

1 REFERENCES IN FILE CA (1907 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 135:77251

L26 ANSWER 29 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 292139-85-6 REGISTRY  
 ED Entered STN: 03 Oct 2000  
 CN Antimony copper molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Cu . Mo . Nb . O . Sb . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
V	x	7440-62-2
Cu	x	7440-50-8
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 138:238549

REFERENCE 2: 133:223163

L26 ANSWER 30 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 292139-84-5 REGISTRY  
 ED Entered STN: 03 Oct 2000  
 CN Antimony molybdenum niobium selenium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Sb . Se . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS



Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Se	x	7782-49-2
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 133:223163

L26 ANSWER 31 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 275817-40-8 REGISTRY  
ED Entered STN: 10 Jul 2000  
CN Molybdenum niobium tellurium vanadium zirconium oxide (9CI) (CA INDEX  
NAME)  
MF Mo . Nb . O . Te . V . Zr  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
Zr	x	7440-67-7
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:88666

REFERENCE 2: 133:43945

L26 ANSWER 32 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 261919-86-2 REGISTRY  
ED Entered STN: 14 Apr 2000  
CN Antimony gallium molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
MF Ga . Mo . Nb . O . Sb . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
V	x	7440-62-2
Ga	x	7440-55-3
Sb	x	7440-36-0
Nb	x	7440-03-1

Mo | x | 7439-98-7

3 REFERENCES IN FILE CA (1907 TO DATE)  
3 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:314762

REFERENCE 2: 139:36960

REFERENCE 3: 132:237515

L26 ANSWER 33 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 260557-95-7 REGISTRY  
ED Entered STN: 03 Apr 2000  
CN Antimony bismuth molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
MF Bi . Mo . Nb . O . Sb . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Bi	x	7440-69-9
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

4 REFERENCES IN FILE CA (1907 TO DATE)  
4 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:314762

REFERENCE 2: 140:170371

REFERENCE 3: 135:242659

REFERENCE 4: 132:208269

L26 ANSWER 34 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 250211-95-1 REGISTRY  
ED Entered STN: 07 Dec 1999  
CN Antimony lithium molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
MF Li . Mo . Nb . O . Sb . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
O	x	17778-80-2
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7
Li	x	7439-93-2

1 REFERENCES IN FILE CA (1907 TO DATE)  
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 131:342549

L26 ANSWER 35 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 224324-73-6 REGISTRY  
ED Entered STN: 11 Jun 1999  
CN Molybdenum niobium scandium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF Mo . Nb . O . Sc . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Sc	x	7440-20-2
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279834

REFERENCE 2: 130:338521

L26 ANSWER 36 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 224324-60-1 REGISTRY  
ED Entered STN: 11 Jun 1999  
CN Molybdenum niobium tellurium terbium vanadium oxide (9CI) (CA INDEX NAME)  
MF Mo . Nb . O . Tb . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Tb	x	7440-27-9
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279834

REFERENCE 2: 130:338521

L26 ANSWER 37 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 224324-51-0 REGISTRY

ED Entered STN: 11 Jun 1999  
 CN Molybdenum niobium praseodymium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Pr . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Pr	x	7440-10-0
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279834

REFERENCE 2: 130:338521

L26 ANSWER 38 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 224324-48-5 REGISTRY  
 ED Entered STN: 11 Jun 1999  
 CN Lanthanum molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF La . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7
La	x	7439-91-0

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 130:338521

L26 ANSWER 39 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 224324-44-1 REGISTRY  
 ED Entered STN: 11 Jun 1999  
 CN Molybdenum niobium samarium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Sm . Te . V  
 CI TIS  
 SR CA

LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Sm	x	7440-19-9
Nb	x	7440-03-1
Mo	x	7439-98-7

4 REFERENCES IN FILE CA (1907 TO DATE)  
4 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 137:338387

REFERENCE 3: 136:279832

REFERENCE 4: 130:338521

L26 ANSWER 40 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 224324-37-2 REGISTRY  
ED Entered STN: 11 Jun 1999  
CN Molybdenum neodymium niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
MF Mo . Nb . Nd . O . Te . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Nd	x	7440-00-8
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:279834

REFERENCE 2: 130:338521

L26 ANSWER 41 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 210831-87-1 REGISTRY  
ED Entered STN: 03 Sep 1998  
CN Antimony molybdenum nickel niobium vanadium oxide (9CI) (CA INDEX NAME)  
MF Mo . Nb . Ni . O . Sb . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS

Component	Ratio	Component
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		Registry Number
O	x	17778-80-2
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Ni	x	7440-02-0
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 129:149337

L26 ANSWER 42 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 210831-85-9 REGISTRY  
 ED Entered STN: 03 Sep 1998  
 CN Antimony cobalt molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Co . Mo . Nb . O . Sb . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
O	x	17778-80-2
V	x	7440-62-2
Co	x	7440-48-4
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 129:149337

L26 ANSWER 43 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 210831-51-9 REGISTRY  
 ED Entered STN: 03 Sep 1998  
 CN Antimony molybdenum niobium vanadium zirconium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Sb . V . Zr  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
O	x	17778-80-2
Zr	x	7440-67-7
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)

2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:88666

REFERENCE 2: 129:149337

L26 ANSWER 44 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 207616-02-2 REGISTRY  
 ED Entered STN: 25 Jun 1998  
 CN Antimony molybdenum niobium rubidium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Rb . Sb . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
V	x	7440-62-2
Sb	x	7440-36-0
Rb	x	7440-17-7
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 129:15908

L26 ANSWER 45 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 207616-00-0 REGISTRY  
 ED Entered STN: 25 Jun 1998  
 CN Antimony molybdenum niobium phosphorus vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . P . Sb . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
P	x	7723-14-0
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 129:15908

L26 ANSWER 46 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 207615-99-4 REGISTRY  
 ED Entered STN: 25 Jun 1998  
 CN Antimony molybdenum niobium potassium vanadium oxide (9CI) (CA INDEX NAME)  
 MF K . Mo . Nb . O . Sb . V

CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
V	x	7440-62-2
Sb	x	7440-36-0
K	x	7440-09-7
Nb	x	7440-03-1
Mo	x	7439-98-7

3 REFERENCES IN FILE CA (1907 TO DATE)  
 3 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:173662

REFERENCE 2: 134:237954

REFERENCE 3: 129:15908

L26 ANSWER 47 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 204920-27-4 REGISTRY  
 ED Entered STN: 30 Apr 1998  
 CN Antimony cerium molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
 MF Ce . Mo . Nb . O . Sb . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
V	x	7440-62-2
Ce	x	7440-45-1
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

3 REFERENCES IN FILE CA (1907 TO DATE)  
 3 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 136:118213

REFERENCE 2: 129:149337

REFERENCE 3: 128:244499

L26 ANSWER 48 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 204125-27-9 REGISTRY  
 ED Entered STN: 15 Apr 1998  
 CN Molybdenum niobium tellurium tungsten vanadium oxide (9CI) (CA INDEX NAME)  
 MF Mo . Nb . O . Te . V . W  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPAT2, USPATFULL



Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
W	x	7440-33-7
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 135:167166

REFERENCE 2: 128:209443

L26 ANSWER 49 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 202708-41-6 REGISTRY  
ED Entered STN: 17 Mar 1998  
CN Antimony calcium molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
MF Ca . Mo . Nb . O . Sb . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Ca	x	7440-70-2
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

3 REFERENCES IN FILE CA (1907 TO DATE)  
3 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 133:335477

REFERENCE 2: 131:342549

REFERENCE 3: 128:155780

L26 ANSWER 50 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
RN 198018-04-1 REGISTRY  
ED Entered STN: 03 Dec 1997  
CN Antimony iron molybdenum niobium vanadium oxide (9CI) (CA INDEX NAME)  
DR 380413-73-0  
MF Fe . Mo . Nb . O . Sb . V  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2

V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7
Fe	x	7439-89-6

5 REFERENCES IN FILE CA (1907 TO DATE)  
5 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 137:389686

REFERENCE 2: 136:38031

REFERENCE 3: 129:149337

REFERENCE 4: 129:17245

REFERENCE 5: 127:331206

L26 ANSWER 51 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 149920-42-3 REGISTRY

ED Entered STN: 10 Sep 1993

CN Molybdenum niobium palladium tellurium vanadium oxide (9CI) (CA INDEX NAME)

OTHER CA INDEX NAMES:

CN Telluric acid, molybdenum niobium palladium vanadium salt

MF Mo . Nb . O . Pd . Te . V

CI TIS

SR CA

LC STN Files: CA, CAPLUS, CASREACT, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Pd	x	7440-05-3
Nb	x	7440-03-1
Mo	x	7439-98-7

8 REFERENCES IN FILE CA (1907 TO DATE)  
8 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 142:482462

REFERENCE 2: 142:447536

REFERENCE 3: 141:43516

REFERENCE 4: 140:305763

REFERENCE 5: 140:289191

REFERENCE 6: 136:279833

REFERENCE 7: 124:147122

REFERENCE 8: 119:139968

L26 ANSWER 52 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 149920-41-2 REGISTRY  
 ED Entered STN: 10 Sep 1993  
 CN Boron molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 OTHER CA INDEX NAMES:  
 CN Molybdenum niobium vanadium borate tellurate  
 MF **B . Mo . Nb . O . Te . V**  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
B	x	7440-42-8
Nb	x	7440-03-1
Mo	x	7439-98-7

1 REFERENCES IN FILE CA (1907 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 119:139968

L26 ANSWER 53 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 149920-40-1 REGISTRY  
 ED Entered STN: 10 Sep 1993  
 CN Bismuth molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 OTHER CA INDEX NAMES:  
 CN Telluric acid, bismuth molybdenum niobium vanadium salt  
 MF **Bi . Mo . Nb . O . Te . V**  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, CASREACT, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
Bi	x	7440-69-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7

5 REFERENCES IN FILE CA (1907 TO DATE)  
 5 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:289191

REFERENCE 2: 136:355590

REFERENCE 3: 136:6499

REFERENCE 4: 122:266250

REFERENCE 5: 119:139968

L26 ANSWER 54 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 149920-38-7 REGISTRY  
 ED Entered STN: 10 Sep 1993  
 CN Antimony molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)

## OTHER CA INDEX NAMES:

CN Telluric acid, antimony molybdenum niobium vanadium salt  
 MF Mo . Nb . O . Sb . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Sb	x	7440-36-0
Nb	x	7440-03-1
Mo	x	7439-98-7

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 139:74539

REFERENCE 2: 119:139968

L26 ANSWER 55 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 146569-70-2 REGISTRY  
 ED Entered STN: 23 Mar 1993  
 CN Manganese molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)

## OTHER CA INDEX NAMES:

CN Telluric acid, manganese molybdenum niobium vanadium salt  
 MF Mn . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, CASREACT, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7
Mn	x	7439-96-5

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 118:149827

L26 ANSWER 56 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 146569-69-9 REGISTRY

ED Entered STN: 23 Mar 1993  
 CN Molybdenum nickel niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 OTHER CA INDEX NAMES:  
 CN Telluric acid, molybdenum nickel niobium vanadium salt  
 MF Mo . Nb . Ni . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, CASREACT, USPAT2, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Ni	x	7440-02-0
Mo	x	7439-98-7

4 REFERENCES IN FILE CA (1907 TO DATE)  
 4 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 140:289191

REFERENCE 3: 136:279833

REFERENCE 4: 118:149827

L26 ANSWER 57 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 146569-68-8 REGISTRY  
 ED Entered STN: 23 Mar 1993  
 CN Magnesium molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 OTHER CA INDEX NAMES:  
 CN Telluric acid, magnesium molybdenum niobium vanadium salt  
 MF Mg . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, CASREACT, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7
Mg	x	7439-95-4

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 118:149827

L26 ANSWER 58 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN

RN 146569-67-7 REGISTRY  
 ED Entered STN: 23 Mar 1993  
 CN Iron molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 OTHER CA INDEX NAMES:  
 CN Telluric acid, iron molybdenum niobium vanadium salt  
 MF Fe . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, CASREACT, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Nb	x	7440-03-1
Mo	x	7439-98-7
Fe	x	7439-89-6

2 REFERENCES IN FILE CA (1907 TO DATE)  
 2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 118:149827

L26 ANSWER 59 OF 59 REGISTRY COPYRIGHT 2005 ACS on STN  
 RN 146569-65-5 REGISTRY  
 ED Entered STN: 23 Mar 1993  
 CN Cobalt molybdenum niobium tellurium vanadium oxide (9CI) (CA INDEX NAME)  
 OTHER CA INDEX NAMES:  
 CN Telluric acid, cobalt molybdenum niobium vanadium salt  
 MF Co . Mo . Nb . O . Te . V  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, CASREACT, USPATFULL

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Te	x	13494-80-9
V	x	7440-62-2
Co	x	7440-48-4
Nb	x	7440-03-1
Mo	x	7439-98-7

4 REFERENCES IN FILE CA (1907 TO DATE)  
 4 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 140:305763

REFERENCE 2: 140:289191

REFERENCE 3: 129:28336

REFERENCE 4: 118:149827

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FILE LAST UPDATED: 18 Jul 2005 (20050718/ED)

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=> d l37 all tot

L37 ANSWER 1 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2005:447045 HCAPLUS

DN 142:482462

ED Entered STN: 26 May 2005

TI Catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products

IN Benderly, Abraham; Chadda, Nitin; **Gaffney, Anne Mae**; Han, Scott; Le, Dominique Hung Nhu; Silvano, Mark Anthony

PA **Rohm and Haas Company, USA**

SO Eur. Pat. Appl., 27 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM B01J023-648

ICS B01J023-62; B01J023-54; B01J035-04

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1533029	A1	20050525	EP 2004-257151	20041118
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR, IS, YU				
	JP 2005144432	A2	20050609	JP 2004-93680	20040326
	US 2005131255	A1	20050616	US 2004-987367	20041112
PRAI	US 2003-523297P	P	20031118		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1533029	ICM	B01J023-648
	ICS	B01J023-62; B01J023-54; B01J035-04
JP 2005144432	FTERM	4G069/AA03; 4G069/AA08; 4G069/BA01A; 4G069/BA01B;

4G069/BA02A; 4G069/BA04A; 4G069/BA05A; 4G069/BA07A;  
 4G069/BB04A; 4G069/BB04B; 4G069/BB06A; 4G069/BB06B;  
 4G069/BB08A; 4G069/BB10A; 4G069/BC01A; 4G069/BC08A;  
 4G069/BC10A; 4G069/BC15A; 4G069/BC18A; 4G069/BC18B;  
 4G069/BC25A; 4G069/BC26A; 4G069/BC30A; 4G069/BC31A;  
 4G069/BC32A; 4G069/BC33A; 4G069/BC34A; 4G069/BC35A;  
 4G069/BC36A; 4G069/BC38A; 4G069/BC44A; 4G069/BC51A;  
 4G069/BC54A; 4G069/BC54B; 4G069/BC55A; 4G069/BC55B;  
 4G069/BC56A; 4G069/BC58A; 4G069/BC59B; 4G069/BC62A;  
 4G069/BC66A; 4G069/BC67A; 4G069/BC68A; 4G069/BC70A;  
 4G069/BC71A; 4G069/BC72A; 4G069/BC72B; 4G069/BC74A;  
 4G069/BC75A; 4G069/BC75B; 4G069/BD07A; 4G069/BD10B;  
 4G069/BD12A; 4G069/BD15A; 4G069/CB07; 4G069/CB17;  
 4G069/CB63; 4G069/FA01; 4G069/FB04; 4G069/FC10;  
 4G169/AA03; 4G169/AA08; 4G169/BA01A; 4G169/BA01B;  
 4G169/BA02A; 4G169/BA04A; 4G169/BA05A; 4G169/BA07A;  
 4G169/BB04A; 4G169/BB04B; 4G169/BB06A; 4G169/BB06B;  
 4G169/BB08A; 4G169/BB10A; 4G169/BC01A; 4G169/BC08A;  
 4G169/BC10A; 4G169/BC15A; 4G169/BC18A; 4G169/BC18B;  
 4G169/BC25A; 4G169/BC26A; 4G169/BC30A; 4G169/BC31A;  
 4G169/BC32A; 4G169/BC33A; 4G169/BC34A; 4G169/BC35A;  
 4G169/BC36A; 4G169/BC38A; 4G169/BC44A; 4G169/BC51A;  
 4G169/BC54A; 4G169/BC54B; 4G169/BC55A; 4G169/BC55B;  
 4G169/BC56A; 4G169/BC58A; 4G169/BC59B; 4G169/BC62A;  
 4G169/BC66A; 4G169/BC67A; 4G169/BC68A; 4G169/BC70A;  
 4G169/BC71A; 4G169/BC72A; 4G169/BC72B; 4G169/BC74A;  
 4G169/BC75A; 4G169/BC75B; 4G169/BD07A; 4G169/BD10B;  
 4G169/BD12A; 4G169/BD15A; 4G169/CB07; 4G169/CB17;  
 4G169/CB63; 4G169/FA01; 4G169/FB04; 4G169/FC10;  
 4H006/AA02; 4H006/AC12; 4H006/AC46; 4H006/BA06;  
 4H006/BA09; 4H006/BA12; 4H006/BA26; 4H006/BA55;  
 4H006/BA60; 4H006/BA81; 4H006/BC10; 4H006/BC13;  
 4H006/BC19; 4H006/BD33; 4H006/BD52; 4H006/BE30;  
 4H006/BS10; 4H039/CA20; 4H039/CA65; 4H039/CC10;  
 4H039/CC30

US 2005131255 NCL 562/546.000; 502/311.000; 502/334.000; 502/208.000;  
 585/616.000; 585/621.000; 585/627.000

AB Alkenes, unsatd. saturated carboxylic acids, saturated carboxylic acids and their

higher analogs are prepared directly from corresponding alkanes utilizing using a mixed bed catalyst at flame temps. in a short contact time reactor. Thus, 8% hexachloroplatinic acid was spiked with indium nitrate pentahydrate, 1.827 g alumina foam monolith was immersed on the resulting catalyst solution at room temperature for 1 h, dried at 100° for 1 h, calcined at 600° for 4 h, the process was repeated twice to give a platinum-indium oxide supported on alumina foam monolith (Pt/In = 10:1), which was used for propane conversion, giving conversion ratio 64% and propylene yield 21%.

ST catalyst system alkane converting alkene oxygenated product;  
 hexachloroplatinic acid indium nitrate pentahydrate reactant; platinum indium oxide supported alumina catalyst propane conversion propylene

IT Oxides (inorganic), uses

RL: CAT (Catalyst use); USES (Uses)

(catalysts; preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)

IT Catalyst supports

Catalysts

(preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)

IT Alkenes, preparation



- RL: IMF (Industrial manufacture); PREP (Preparation)  
(preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT Carboxylic acids, miscellaneous  
RL: MSC (Miscellaneous)  
(preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT Alkanes, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT Carboxylic acids, miscellaneous  
RL: MSC (Miscellaneous)  
(unsatd., esters; preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT Carboxylic acids, miscellaneous  
RL: MSC (Miscellaneous)  
(unsatd.; preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT 1344-28-1, Alumina, uses  
RL: **CAT (Catalyst use); USES (Uses)**  
(catalyst support; preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT 7440-06-4, Platinum, uses  
RL: **CAT (Catalyst use); USES (Uses)**  
(catalyst; preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT 149920-42-3P 852178-33-7P, Indium platinum oxide 852178-34-8P,  
Niobium platinum oxide 852178-35-9P, Niobium palladium vanadium oxide  
RL: **CAT (Catalyst use); IMF (Industrial manufacture);  
PREP (Preparation); USES (Uses)**  
(catalyst; preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT 207398-97-8  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalyst; preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT 115-07-1P, Propylene, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT 75-28-5, Isobutane 79-10-7, Acrylic acid, miscellaneous 79-41-4,  
Methacrylic acid, miscellaneous 106-97-8, Butane, miscellaneous  
115-11-7, Isobutylene, miscellaneous 25167-67-3, Butylene  
RL: MSC (Miscellaneous)  
(preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- IT 74-98-6, Propane, reactions 144-62-7, Oxalic acid, reactions  
7697-37-2, Nitric acid, reactions 7803-55-6, Ammonium metavanadate  
11120-48-2, Telluric acid 12054-85-2 16941-12-1, Hexachloroplatinic  
acid 38882-00-7 207596-32-5 264924-29-0  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(preparation of catalyst systems for converting alkanes to alkenes and to their corresponding oxygenated products)
- RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
- RE
- (1) Duhaut, P; US 3793232 A 1974 HCAPLUS
- (2) Johnson Matthey Japan Ltd; EP 0960649 A 1999 HCAPLUS
- (3) Michel; US 3909393 A 1975 HCAPLUS
- (4) Phillips Petroleum Cy; FR 2103122 A 1972 HCAPLUS

## (5) Total Raffinage Distribution S A; EP 0864359 A 1998 HCAPLUS

L37 ANSWER 2 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2004:493596 HCAPLUS  
 DN 141:43516  
 ED Entered STN: 18 Jun 2004  
 TI NOx treated mixed metal oxide catalyst  
 IN **Gaffney, Anne Mae**; Heffner, Michele Doreen; **Song, Ruozhi**  
 PA USA  
 SO U.S. Pat. Appl. Publ., 15 pp., Cont.-in-part of Ser. No. 116,241.  
 CODEN: USXXCO  
 DT Patent  
 LA English  
 IC ICM B01J023-00  
 ICS C07C051-16  
 INCL 562546000; 562547000; 502302000  
 CC 67-1 (**Catalysis**, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
 Section cross-reference(s): 35

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004116737	A1	20040617	US 2003-731523	20031209 <--
	US 2002183547	A1	20021205	US 2002-116241	20020404 <--
	US 6818588	B2	20041116		
	US 2004116731	A1	20040617	US 2003-722710	20031125 <--
	US 6916945	B2	20050712		
PRAI	US 2001-283260P	P	20010412	<--	
	US 2002-116241	A2	20020404	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004116737	ICM	B01J023-00
	ICS	C07C051-16
	INCL	562546000; 562547000; 502302000
US 2004116737	NCL	562/546.000; 562/547.000; 502/302.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J027/057T; C07C051/25B+57/03; C07C253/24 <--
US 2002183547	NCL	502/311.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J027/057T; C07C051/25B+57/03; C07C253/24 <--
US 2004116731	NCL	558/320.000; 502/312.000; 562/545.000
	ECLA	B01J023/00B; B01J023/28; B01J027/057T; C07C051/25B+57/03; C07C253/24; B01J023/20 <--

AB An improved catalyst comprising a mixed metal oxide, either promoted or not, is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane or a mixture of an alkane and an alkene to an unsatd. nitrile. Thus, 10 mL 5% aqueous nitric acid and 50 mL an aqueous solution containing niobium oxalate (0.25 M Nb) and 0.31 M oxalic acid was added into an 100 mL aqueous solution containing ammonium heptamolybdate tetrahydrate (1.0 M Mo), ammonium metavanadate (0.3 M V), and telluric acid (0.23 M Te) and stirred, water was removed at 50° under 20 mmHg, the solid material was dried at 25° in a vacuum oven, calcined at 275° in an air atmospheric, and calcined at 600° under argon atmospheric to give a catalyst, which was used as a catalyst for oxidation of propane at 390° under steam and air (propane:steam:air = 1:3:96), giving acrylic acid with yield 34% and C3 conversion 63%.

- ST NOx treated mixed metal oxide catalyst; niobium oxalate ammonium heptamolybdate tetrahydrate metavanadate telluric acid reactant; nitric acid treated molybdenum niobium tellurium vanadium oxide catalyst; propane catalytic oxidn acrylic acid prepn
- IT Oxidation **catalysts**  
(gas-phase; preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT Ammoxidation  
Ammoxidation **catalysts**  
Calcination  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT Oxides (inorganic), uses  
RL: **CAT (Catalyst use); USES (Uses)**  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT Alkanes, reactions  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT Alkenes, reactions  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT Carboxylic acids, preparation  
Nitriles, preparation  
RL: **IMF (Industrial manufacture); PREP (Preparation)**  
(unsatd.; preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT 146569-48-4P, Molybdenum niobium tellurium vanadium oxide  
RL: **CAT (Catalyst use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)**  
(preparation of NOx treated mixed metal oxide catalysts)
- IT 7803-55-6, Ammonium metavanadate 11120-48-2, Telluric acid 12054-85-2  
21348-59-4, Niobium oxalate  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(preparation of NOx treated mixed metal oxide catalysts)
- IT **149920-42-3P**, Molybdenum niobium palladium tellurium vanadium oxide  
RL: **CAT (Catalyst use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)**  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT 79-10-7P, Acrylic acid, preparation  
RL: **IMF (Industrial manufacture); PREP (Preparation)**  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT 11104-93-1, NOx, uses  
RL: **MOA (Modifier or additive use); USES (Uses)**  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)
- IT 6484-52-2, Ammonium nitrate, miscellaneous 7697-37-2, Nitric acid, miscellaneous 10102-43-9, Nitrogen oxide (NO), miscellaneous 10102-44-0, Nitrogen oxide (NO2), miscellaneous 13446-48-5, Ammonium nitrite  
RL: **MSC (Miscellaneous)**  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor oxidation of alkane to unsatd. carboxylic acids)

IT 74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions 10102-05-3D,  
Palladium nitrate, hydrate  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor  
oxidation of alkane to unsatd. carboxylic acids)

L37 ANSWER 3 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2004:269923 HCAPLUS  
DN 140:305763  
ED Entered STN: 02 Apr 2004  
TI Hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective  
oxidation of hydrocarbons  
IN **Gaffney, Anne Mae; Song, Ruozhi**  
PA USA  
SO U.S. Pat. Appl. Publ., 21 pp.  
CODEN: USXXCO  
DT Patent  
LA English  
IC ICM B01J027-128  
ICS B01J027-132; B01J027-135; B01J027-06; B01J027-13; B01J027-125;  
B01J027-192; B01J027-19; B01J027-188; B01J027-198; B01J027-199;  
B01J027-187; B01J027-186; B01J027-14  
INCL 558322000; 502312000; 502224000; 502227000; 502228000; 502229000;  
502230000; 502231000; 502208000; 502209000  
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 67  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004063990	A1	20040401	US 2003-676884	20030930 <--
	EP 1407819	A2	20040414	EP 2003-255811	20030917 <--
	EP 1407819	A3	20040623		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
	BR 2003004188	A	20040831	BR 2003-4188	20030922 <--
	JP 2004148302	A2	20040527	JP 2003-340313	20030930 <--
PRAI	US 2002-415288P	P	20021001	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004063990	ICM	B01J027-128
	ICS	B01J027-132; B01J027-135; B01J027-06; B01J027-13; B01J027-125; B01J027-192; B01J027-19; B01J027-188; B01J027-198; B01J027-199; B01J027-187; B01J027-186; B01J027-14
	INCL	558322000; 502312000; 502224000; 502227000; 502228000; 502229000; 502230000; 502231000; 502208000; 502209000
US 2004063990	NCL	558/322.000; 502/312.000; 502/224.000; 502/227.000; 502/228.000; 502/229.000; 502/230.000; 502/231.000; 502/208.000; 502/209.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J023/34; B01J023/652D; B01J023/887K; B01J027/057T; B01J037/10; C07C051/215+57/04; C07C253/24; C07C253/26 <--
EP 1407819	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J023/34; B01J023/652D; B01J023/887K; B01J027/057T; B01J027/132; B01J037/10; C07C051/215+57/04; C07C253/24; C07C253/26 <--
JP 2004148302	FTERM	4G069/AA02; 4G069/AA08; 4G069/BB06A; 4G069/BB06B; 4G069/BC01A; 4G069/BC03A; 4G069/BC03B; 4G069/BC04A; 4G069/BC04B; 4G069/BC08A; 4G069/BC09A; 4G069/BC09B;

4G069/BC10A; 4G069/BC10B; 4G069/BC17A; 4G069/BC18A;  
 4G069/BC18B; 4G069/BC21A; 4G069/BC21B; 4G069/BC24A;  
 4G069/BC30A; 4G069/BC35A; 4G069/BC35B; 4G069/BC38A;  
 4G069/BC42A; 4G069/BC42B; 4G069/BC44A; 4G069/BC44B;  
 4G069/BC49A; 4G069/BC53A; 4G069/BC54A; 4G069/BC54B;  
 4G069/BC55A; 4G069/BC55B; 4G069/BC58A; 4G069/BC58B;  
 4G069/BC59A; 4G069/BC59B; 4G069/BC61A; 4G069/BC62A;  
 4G069/BC62B; 4G069/BC66A; 4G069/BC66B; 4G069/BC67A;  
 4G069/BC67B; 4G069/BC68A; 4G069/BC68B; 4G069/BC69A;  
 4G069/BC71A; 4G069/BC71B; 4G069/BC72A; 4G069/BC72B;  
 4G069/BC75A; 4G069/BC75B; 4G069/BD03A; 4G069/BD07A;  
 4G069/BD09A; 4G069/BD10A; 4G069/BD10B; 4G069/BD12A;  
 4G069/BD12B; 4G069/BD13A; 4G069/BD13B; 4G069/BD14A;  
 4G069/BD14B; 4G069/BD15A; 4G069/CB07; 4G069/CB53;  
 4G069/CB54; 4G069/CB74; 4G069/FB04; 4H006/AA02;  
 4H006/AC46; 4H006/BA12; 4H006/BA14; 4H006/BA15;  
 4H006/BA25; 4H006/BA30; 4H006/BB62; 4H006/BC31;  
 4H006/BC35; 4H006/BE30; 4H039/CA65; 4H039/CC10;  
 4H039/CC30

&lt;--

- AB Hydrothermally synthesized catalysts comprising a mixed metal oxide are utilized to produce unsatd. carboxylic acids by the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, in the presence thereof; or to produce unsatd. nitriles by the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, and ammonia in the presence thereof.
- ST mixed metal oxide oxidn catalyst unsatd acid nitrile
- IT Ammoxidation  
 Oxidation  
 (gas-phase; hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)
- IT Oxidation **catalysts**  
 (hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)
- IT Alkanes, reactions  
 Alkenes, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)
- IT Oxides (inorganic), uses  
 RL: CAT (**Catalyst use**); USES (Uses)  
 (mixed metal; hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)
- IT Carboxylic acids, preparation  
 Nitriles, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (unsatd.; hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)
- IT **146569-65-5P**, Cobalt molybdenum niobium tellurium vanadium oxide  
**146569-67-7P**, Iron molybdenum niobium tellurium vanadium oxide  
**146569-68-8P**, Magnesium molybdenum niobium tellurium vanadium oxide  
**146569-69-9P**, Molybdenum nickel niobium tellurium vanadium oxide  
**146569-70-2P**, Manganese molybdenum niobium tellurium vanadium oxide  
**149920-42-3P**, Molybdenum niobium palladium tellurium vanadium oxide  
**224324-44-1P**, Molybdenum niobium samarium tellurium vanadium oxide  
**224324-48-5P**, Lanthanum molybdenum niobium tellurium vanadium oxide  
**406675-48-7P**, Molybdenum niobium tellurium vanadium zinc oxide  
**406675-79-4P**, Molybdenum niobium tellurium vanadium bromide oxide  
**406675-80-7P**, Molybdenum niobium tellurium vanadium chloride oxide  
**406675-82-9P**, Molybdenum niobium tellurium vanadium iodide oxide  
**406675-87-4P**, Indium molybdenum niobium tellurium vanadium oxide

675571-72-9P, Lead molybdenum niobium tellurium vanadium oxide

676365-84-7P 676365-85-8P 676365-86-9P

676365-87-0P 676365-88-1P 676365-89-2P

RL: CAT (Catalyst use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

(hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)

IT 79-10-7P, Acrylic acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)

IT 74-98-6, Propane, reactions 7446-07-3, Tellurium dioxide 7757-79-1, Potassium nitrate, reactions 7779-88-6, Zinc nitrate 7790-69-4, Lithium nitrate 10099-59-9, Lanthanum nitrate 10099-74-8, Lead (II) nitrate 10102-05-3, Palladium nitrate 10124-37-5, Calcium nitrate 10139-58-9, Rhodium nitrate 10141-05-6, Cobalt(II) nitrate 10241-05-1, Molybdenum (V) chloride 10361-83-8, Samarium nitrate 10377-60-3, Magnesium nitrate 10377-66-9, Manganese(II) nitrate 10421-48-4, Iron(III) nitrate 12054-85-2 13138-45-9, Nickel(II) nitrate 13446-57-6, Molybdenum (III) bromide 13548-38-4, Chromium trinitrate 13770-61-1, Indium(III) nitrate 15513-94-7, Vanadium iodide (VI3) 20634-12-2, Tetraamineplatinum(II) dinitrate 27774-13-6, Vanadyl sulfate 168547-43-1

RL: RCT (Reactant); RACT (Reactant or reagent)

(hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the selective oxidation of hydrocarbons)

L37 ANSWER 4 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2004:267190 HCAPLUS

DN 140:289191

ED Entered STN: 01 Apr 2004

TI Heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid

IN Dieterle, Martin; Borgmeier, Frieder; Mueller-Engel, Klaus Joachim; Hibst, Hartmut

PA BASF Aktiengesellschaft, Germany

SO U.S. Pat. Appl. Publ., 30 pp.

CODEN: USXXCO

DT Patent

LA English

IC ICM B05D003-02

ICS B32B027-04; B32B027-12; B32B005-02

INCL 427372200; 442118000

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	US 2004062870	A1	20040401	US 2003-667786	20030923	<--
	DE 10245585	A1	20040408	DE 2002-10245585	20020927	<--
	DE 10246119	A1	20040415	DE 2002-10246119	20021001	<--
	DE 10248584	A1	20040429	DE 2002-10248584	20021017	
	DE 10254278	A1	20040226	DE 2002-10254278	20021120	
	DE 10254279	A1	20040603	DE 2002-10254279	20021120	
	DE 10261186	A1	20040708	DE 2002-10261186	20021220	
	EP 1546073	A1	20050629	EP 2003-769283	20030918	<--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK					
	EP 1546074	A1	20050629	EP 2003-798911	20030918	<--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK					

PRAI DE 2002-10245585 A 20020927 <--  
 DE 2002-10246119 A 20021001 <--  
 DE 2002-10248584 A 20021017  
 DE 2002-10254278 A 20021120  
 DE 2002-10254279 A 20021120  
 DE 2002-10261186 A 20021220  
 WO 2003-EP10374 W 20030918  
 WO 2003-EP10375 W 20030918

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004062870	ICM	B05D003-02
	ICS	B32B027-04; B32B027-12; B32B005-02
	INCL	427372200; 442118000
US 2004062870	NCL	427/372.200; 442/118.000
DE 10254278	ECLA	C01G033/00D; C01G039/00D
OS	CASREACT	140:289191
AB	A process for the heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid over a multimetal oxide material having a specific structure, which contains the elements Mo and V, at least one of the elements Te and Sb and at least one of the elements from the group consisting of Nb, Ta, W and Ti and is doped with promoter elements, is described. The catalysts have a specified x-ray diffraction pattern.	
ST	acrolein oxidn acrylic acid multimetal catalyst; molybdenum vanadium oxide catalyst oxidn	
IT	Oxidation Oxidation catalysts (heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid)	
IT	Oxides (inorganic), uses RL: CAT (Catalyst use); USES (Uses) (multimetal; heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid)	
IT	146569-65-5P 146569-69-9P 149920-40-1P 149920-42-3P 675571-72-9P RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses) (heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid)	
IT	79-10-7P, Acrylic acid, preparation RL: IMF (Industrial manufacture); PREP (Preparation) (heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid)	
IT	107-02-8, Acrolein, reactions 115-07-1, Propene, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid)	

L37 ANSWER 5 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2003:238304 HCAPLUS

DN 138:238549

ED Entered STN: 27 Mar 2003

TI Process for producing acrylic acid

IN Yunoki, Hiromi

PA Nippon Shokubai Co., Ltd., Japan

SO Eur. Pat. Appl., 11 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM B01J023-16

ICS B01J023-68; B01J023-887; C07C051-25; C07C057-04  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1295636	A2	20030326	EP 2002-20181	20020909 <--
	EP 1295636	A3	20030806		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK				
	JP 2003089671	A2	20030328	JP 2001-285033	20010919 <--
	US 2003125580	A1	20030703	US 2002-228089	20020827 <--
	TW 583022	B	20040411	TW 2002-91120800	20020910 <--
	BR 2002003782	A	20030603	BR 2002-3782	20020917 <--
	CN 1408700	A	20030409	CN 2002-142436	20020919 <--
PRAI	JP 2001-285033	A	20010919	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1295636	ICM	B01J023-16
	ICS	B01J023-68; B01J023-887; C07C051-25; C07C057-04
EP 1295636	ECLA	B01J023/00B; B01J023/887K; B01J035/00B <--
US 2003125580	NCL	562/535.000
	ECLA	B01J023/00B; B01J023/887K; B01J035/00B; C07C051/25B+57/04 <--

AB The present invention provides a process for producing acrylic acid, by which process the problem, such that the catalyst placed on the gas inlet side deteriorates faster than that placed on the gas outlet side, is solved, so that the catalyst can be used stably for a long time. The process for producing acrylic acid, according to the present invention, comprises the step of carrying out catalytic gas phase oxidation with a fixed-bed shell-and-tube reactor as packed with a catalyst, wherein: used as the catalyst is an oxide shown by the following general formula (1): MoaVbAcBdCeOf (1) (wherein: A shows at least one member selected from the group consisting of niobium and tungsten; B shows at least one member selected from the group consisting of chromium, manganese, iron, cobalt, nickel, copper, zinc, and bismuth; C shows at least one member selected from the group consisting of phosphorus, tin, antimony, and tellurium); and at least two reaction zones as provided by dividing the inside of each reaction tube in a direction of an axis of the tube in the reactor are packed with the catalyst such that there are regulated the kind and/or amount of the A component and/or the kind and/or amount of the B component.

ST acrylic acid prepn mixed metal oxide carboxylation catalyst

IT Carboxylation catalysts

(process for producing acrylic acid)

IT 178468-18-3P, Antimony copper molybdenum tungsten vanadium oxide  
 182748-67-0P, Antimony copper molybdenum niobium tungsten vanadium oxide  
 292139-85-6P, Antimony copper molybdenum niobium vanadium oxide  
 501644-87-7P 501644-88-8P

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(process for producing acrylic acid)

IT 79-10-7P, Acrylic acid, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (process for producing acrylic acid)

IT 107-02-8, Acrolein, reactions 1309-64-4, Antimony trioxide, reactions 7757-79-1, Potassium nitrate, reactions 7803-55-6, Ammonium metavanadate 10031-43-3, Copper nitrate trihydrate 11098-84-3, Ammonium molybdate 11120-25-5, Ammonium paratungstate 37349-30-7, Niobic acid  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (process for producing acrylic acid)



L37 ANSWER 6 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2003:76688 HCAPLUS  
 DN 138:122955  
 ED Entered STN: 31 Jan 2003  
 TI Catalyst for the selective oxidation and ammoxidation of alkanes and/or  
 alkenes to (meth)acrylic acid or acrylonitrile  
 IN Lopez Nieto, Jose Manuel; Botella, Asuncion Pablo; Solsona, Espriu  
 Benjamin  
 PA Consejo Superior De Investigaciones Cientificas, Spain; Universidad  
 Politecnica De Valencia  
 SO PCT Int. Appl., 38 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA Spanish  
 IC ICM B01J023-887  
 ICS B01J027-057; C07C045-35; C07C051-215; C07C051-25; C07C057-04;  
 C07C253-24; C07C255-08  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 45  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	WO 2003008096	A1	20030130	WO 2002-ES357	20020716	<--
	W: CA, JP, US					
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT,					
	LU, MC, NL, PT, SE, SK, TR					
	ES 2181600	A1	20030216	ES 2001-1756	20010717	<--
	ES 2181600	B1	20040116			
	EP 1473081	A1	20041103	EP 2002-748887	20020716	<--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,					
	IE, FI, CY, TR, BG, CZ, EE, SK					
	JP 2004534650	T2	20041118	JP 2003-513694	20020716	<--
	US 2004230070	A1	20041118	US 2004-759384	20040116	<--
PRAI	ES 2001-1756	A	20010717			<--
	WO 2002-ES357	W	20020716			<--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003008096	ICM	B01J023-887
	ICS	B01J027-057; C07C045-35; C07C051-215; C07C051-25; C07C057-04; C07C253-24; C07C255-08
WO 2003008096	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J023/887K; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24; C07C253/26
EP 1473081	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J023/887K; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24; C07C253/26
JP 2004534650	FTERM	4G069/AA02; 4G069/AA03; 4G069/AA08; 4G069/BA01A; 4G069/BA02A; 4G069/BA04A; 4G069/BB06A; 4G069/BB06B; 4G069/BB15A; 4G069/BC22A; 4G069/BC31A; 4G069/BC31B; 4G069/BC38A; 4G069/BC50A; 4G069/BC54A; 4G069/BC54B; 4G069/BC55A; 4G069/BC55B; 4G069/BC56A; 4G069/BC58A; 4G069/BC59A; 4G069/BC59B; 4G069/BC66A; 4G069/BC67A; 4G069/BC68A; 4G069/BD05A; 4G069/BD09A; 4G069/BD10A; 4G069/BD10B; 4G069/CB17; 4G069/CB54; 4G069/DA05; 4G069/EA02Y; 4G069/EC25; 4G069/FA01; 4G069/FA02; 4G069/FB05; 4G069/FB30; 4G069/FB31; 4G069/FC08; 4H006/AA02; 4H006/AC46; 4H006/AC54; 4H006/BA05; 4H006/BA12; 4H006/BA14; 4H006/BA15; 4H006/BA30;

4H006/BA82; 4H006/BA85; 4H006/BS10; 4H006/QN24;  
 4H039/CA65; 4H039/CA70; 4H039/CC30; 4H039/CL50 <--  
 US 2004230070 NCL 558/323.000; 562/547.000  
 ECLA B01J023/00B; B01J023/20; B01J023/28; B01J023/887K;  
 B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04;  
 C07C253/24; C07C253/26 <--  
 AB Catalysts for the selective oxidation and ammoxidn. of alkanes and/or alkenes to acrylic acid, acrylonitrile, or their derivs. comprise at least one oxide, preferably a calcined mixed oxide of Mo, Te, V, Cu and at least one other compound A which is selected from Nb, Ta, Sn, Se, W, Ti, Fe, Co, Ni, Cr, Ga, Sb, Bi, a rare earth, an alkaline or alkaline-earth metal. In the calcined form, the X-ray diffractogram of the catalyst comprises five intense diffraction lines, typically the most intense, corresponding to diffraction angles  $2\theta$  of  $22.1 \pm 0.4$ ;  $27.1 \pm 0.4$ ;  $28.1 \pm 0.4$ ;  $36 \pm 0.4$  y  $45.1 \pm 0.4$ . According to a preferred production method, the catalyst has empirical formula:  $\text{MoTe}_h\text{ViCu}_j\text{AkO}_x$ , wherein h, i, j, and k denote values of between 0.001 and 4 and x is dependent on the oxidation state or the valency of elements Mo, Te, V, Cu and A.  
 ST mixed metal oxide catalyst acrylic acid prepn; acrylonitrile prepn mixed metal oxide catalyst  
 IT Ammoxidation catalysts  
 Oxidation catalysts  
 (mixed metal oxide catalyst for the selective oxidation and ammoxidn. of alkanes and/or alkenes to (meth)acrylic acid or acrylonitrile)  
 IT Alkanes, reactions  
 Alkenes, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (mixed metal oxide catalyst for the selective oxidation and ammoxidn. of alkanes and/or alkenes to (meth)acrylic acid or acrylonitrile)  
 IT Oxides (inorganic), preparation  
 RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (mixed; mixed metal oxide catalyst for the selective oxidation and ammoxidn. of alkanes and/or alkenes to (meth)acrylic acid or acrylonitrile)  
 IT 146569-47-3P, Molybdenum tellurium vanadium oxide 146569-48-4P, Molybdenum niobium tellurium vanadium oxide **406681-66-1P**, Copper molybdenum niobium tellurium vanadium oxide 491596-18-0P  
 RL: CAT (Catalyst use); **SPN (Synthetic preparation)**; **PREP (Preparation)**; USES (Uses)  
 (mixed metal oxide catalyst for the selective oxidation and ammoxidn. of alkanes and/or alkenes to (meth)acrylic acid or acrylonitrile)  
 IT 79-10-7P, Acrylic acid, preparation 79-41-4P, Methacrylic acid, preparation 107-13-1P, Acrylonitrile, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (mixed metal oxide catalyst for the selective oxidation and ammoxidn. of alkanes and/or alkenes to (meth)acrylic acid or acrylonitrile)  
 IT 74-98-6, Propane, reactions 75-28-5, Isobutane 115-07-1, Propylene, reactions 115-11-7, Isobutylene, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (mixed metal oxide catalyst for the selective oxidation and ammoxidn. of alkanes and/or alkenes to (meth)acrylic acid or acrylonitrile)  
 RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 RE  
 (1) Basf; ES 2061572 T 1994 HCAPLUS  
 (2) Mitsubishi Chemical Corp; EP 970942 A 2000 HCAPLUS  
 (3) Mitsubishi Chemical Corp; EP 997454 A 2000 HCAPLUS  
 (4) Rohm & Haas Co; EP 962253 A 1999 HCAPLUS  
 (5) The Standard Oil Co; EP 489506 A 1992 HCAPLUS  
 (6) The Standard Oil Company; EP 31693 A 1981 HCAPLUS

L37 ANSWER 7 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2002:914786 HCAPLUS  
 DN 137:389686  
 ED Entered STN: 03 Dec 2002  
 TI Production method of oxidation reaction catalyst for gas phase production  
 of unsatd. nitriles and carboxylic acids  
 IN Hinako, Hidenori; Watanabe, Mamoru  
 PA Asahi Kasei Corporation, Japan  
 SO Jpn. Kokai Tokkyo Koho, 9 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM B01J023-28  
 ICS B01J023-88; B01J037-08; C01G049-00; C07C051-215; C07C057-05;  
 C07C253-24; C07C255-08; C07B061-00  
 CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
 Section cross-reference(s): 78

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002346384	A2	20021203	JP 2001-193166	20010626 <--
PRAI	JP 2001-83110	A	20010322	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2002346384	ICM	B01J023-28
	ICS	B01J023-88; B01J037-08; C01G049-00; C07C051-215; C07C057-05; C07C253-24; C07C255-08; C07B061-00

AB The invention refers to an oxidation reaction catalyst used to produce unsatd. nitriles and carboxylic acids from propane or isobutane ammoxidn. in the gas phase, wherein a stock mixture containing precursors of Mo, V, Sb, Te, and a complex oxide of the other elements in the catalyst is used to form the catalyst  $MolVaXbNbcZdOn$  [ $X = Sb$  and/or  $Te$ ;  $Z = Bi, Ti, W, Cr, Al, Ta, Zr, Hf, Mn, Re, Fe, Ru, Rh, Ni, Pd, Pt, Cu, Ag, Zn, B, Ga, In, Ge, Sn, P, Pb, Y$ ;  $0.1 < a < 1$ ;  $0.01 < b < 0.6$ ;  $0.01 < c < 0.3$ ;  $0 < d < 1$ ;  $n =$  dependent on the oxidation of the metals].

ST ammoxidn catalyst gas phase reaction complex oxide

IT Reaction

(gas-phase; production method for oxidation reaction catalyst)

IT Ammoxidation

Ammoxidation catalysts

(production method for oxidation reaction catalyst)

IT Carboxylic acids, preparation

Nitriles, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)

(unsatd.; production method for oxidation reaction catalyst)

IT 7631-86-9, Silica, uses

RL: CAT (Catalyst use); USES (Uses)

(production method for oxidation reaction catalyst)

IT 198018-04-1P 380413-70-7P

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(production method for oxidation reaction catalyst)

IT 74-98-6, Propane, reactions 1309-64-4, Antimony oxide, reactions

1313-96-8, Niobium oxide 7664-41-7, Ammonia, reactions 7782-44-7,

Oxygen, reactions 7803-55-6 148047-77-2, Antimony iron oxide ( $SbFeO_3$ )

338746-13-7 380413-71-8, Aluminum antimony oxide ( $AlSbO_3$ ) 380413-72-9,

Aluminum antimony oxide ( $Al_{1.2}SbO_{3.3}$ )

RL: RCT (Reactant); RACT (Reactant or reagent)

(production method for oxidation reaction catalyst)

L37 ANSWER 8 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2002:847496 HCAPLUS  
 DN 137:338387  
 ED Entered STN: 08 Nov 2002  
 TI Annealed and promoted catalyst for the production of unsatd. carboxylic acids and nitriles  
 IN Gaffney, Anne Mae; Heffner, Michele Doreen; Song, Ruozhi  
 PA Rohm and Haas Company, USA  
 SO Eur. Pat. Appl., 18 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM B01J023-00  
 ICS B01J023-10; B01J023-20; B01J023-28; C07C253-24; C07C051-215  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1254706	A2	20021106	EP 2002-252860	20020423 <--
	EP 1254706	A3	20030402		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	US 2002183198	A1	20021205	US 2002-117904	20020408 <--
	US 6645905	B2	20031111		
	TW 575542	B	20040211	TW 2002-91107761	20020416 <--
	BR 2002001364	A	20030610	BR 2002-1364	20020422 <--
	CN 1383916	A	20021211	CN 2002-118440	20020425 <--
	JP 2003038960	A2	20030212	JP 2002-123833	20020425 <--
	US 2004029725	A1	20040212	US 2003-636113	20030807 <--
PRAI	US 2001-286278P	P	20010425	<--	
	US 2002-117904	A3	20020408	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1254706	ICM	B01J023-00
	ICS	B01J023-10; B01J023-20; B01J023-28; C07C253-24; C07C051-215
EP 1254706	ECLA	B01J023/00B; B01J023/10; B01J023/22; B01J023/28; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
US 2002183198	NCL	502/311.000; 502/312.000; 558/323.000
	ECLA	C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
US 2004029725	NCL	502/208.000; 502/302.000; 502/309.000; 502/310.000; 502/306.000; 502/311.000; 502/209.000; 502/210.000; 502/211.000; 502/212.000
	ECLA	B01J023/00B; B01J023/10; B01J023/22; B01J023/28; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--

AB A mixed metal oxide, which may be an orthorhombic phase material, is improved as a catalyst for the production of unsatd. carboxylic acids, or unsatd. nitriles, from alkanes, or mixts. of alkanes and alkenes, by: contacting with a liquid contact member selected from the group consisting of organic acids, alcs., inorg. acids, and hydrogen peroxide to form a contact mixture; recovering insol. material from the contact mixture; calcining the recovered insol. material in a non-oxidizing atmospheric; and mixing the calcined recovered insol. material with (i) at least one promoter element or compound thereof and (ii) at least one solvent for the at least one promoter element or compound thereof; removing the at least one

solvent to form a catalyst precursor; and calcining the catalyst precursor.

ST samarium contg metal oxide carboxylation catalyst acrylic acid prepn

IT Carboxylation **catalysts**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Oxides (inorganic), uses  
RL: **CAT (Catalyst use); USES (Uses)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Nitriles, preparation  
RL: **IMF (Industrial manufacture); PREP (Preparation)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Alcohols, reactions  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Alkanes, reactions  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Alkenes, reactions  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Acids, reactions  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(inorg.; annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Acids, reactions  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(organic; annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT Carboxylic acids, preparation  
RL: **IMF (Industrial manufacture); PREP (Preparation)**  
(unsatd.; annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT **224324-44-1P, Molybdenum niobium samarium tellurium vanadium oxide**  
RL: **CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT **79-10-7P, Acrylic acid, preparation**  
RL: **IMF (Industrial manufacture); PREP (Preparation)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT **74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions 7722-84-1, Hydrogen peroxide, reactions**  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

IT **144-62-7, Oxalic acid, reactions 7440-19-9, Samarium, reactions 7697-37-2, Nitric acid, reactions 7803-55-6, Ammonium metavanadate 11120-48-2, Telluric acid 12054-85-2 21348-59-4, Niobium oxalate**  
RL: **RCT (Reactant); RACT (Reactant or reagent)**  
(catalyst preparation reactant; annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

L37 ANSWER 9 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2002:504687 HCAPLUS  
 DN 137:79353  
 ED Entered STN: 05 Jul 2002  
 TI Alkane oxidation catalysts, process for producing them, and process for  
 producing oxygen-containing unsaturated compounds  
 IN Kobayashi, Tomoaki; Seo, Yoshimasa  
 PA Nippon Kayaku Kabushiki Kaisha, Japan  
 SO PCT Int. Appl., 24 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA Japanese  
 IC ICM B01J023-28  
 ICS B01J023-30; B01J027-057; C07C045-35; C07C047-22; C07C051-215;  
 C07C057-05  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002051542	A1	20020704	WO 2001-JP11180	20011220 <--
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,				
	CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,				
	GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,				
	LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL,				
	PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG,				
	US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH,				
	CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR,				
	BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	JP 2002361085	A2	20021217	JP 2001-384086	20011218 <--
	EP 1346766	A1	20030924	EP 2001-272266	20011220 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				
	IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	TW 583023	B	20040411	TW 2001-90131616	20011220 <--
	BR 2001016366	A	20040706	BR 2001-16366	20011220 <--
	ZA 2003004713	A	20041018	ZA 2003-4713	20011220 <--
	US 2004054221	A1	20040318	US 2003-450373	20030610 <--
PRAI	JP 2000-391078	A	20001222	<--	
	JP 2001-94513	A	20010329	<--	
	JP 2001-108122	A	20010406	<--	
	WO 2001-JP11180	W	20011220	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2002051542	ICM	B01J023-28
	ICS	B01J023-30; B01J027-057; C07C045-35; C07C047-22; C07C051-215; C07C057-05
WO 2002051542	ECLA	B01J023/00B; B01J023/18; B01J023/22; B01J023/28; B01J027/057T; B01J037/08; B01J037/10; C07C045/33; C07C045/33+47/22; C07C051/215+57/04 <--
EP 1346766	ECLA	B01J023/00B; B01J023/18; B01J023/22; B01J023/28; B01J027/057T; B01J037/08; B01J037/10; C07C045/33; C07C051/215+57/04 <--
US 2004054221	NCL	562/547.000; 502/309.000
	ECLA	B01J023/00B; B01J023/22; B01J023/28; B01J027/057T; B01J037/08; B01J037/10; C07C045/33; C07C045/33+47/22; C07C051/215+57/04; B01J023/18 <--
AB		High-activity catalysts Mol.0VaTibXcYdOe or Mol.0VaTibXcYdZfOe (X = Sb,

Te; Y = Nb, W, Zr; Z = Li, Na, K, Rb, Cs, Mg, Ca, Sr; a, b, c, d, e, f = atomic proportions of the resp. elements;  $0 < a < 0.7$ ;  $0 < b < 0.3$ ;  $0 < c < 0.7$ ;  $0 \leq d < 0.3$ ;  $0 < f < 0.1$ ; e = number determined by the oxidized states of the other elements) are prepared and used for oxidation of alkanes. The catalysts are especially suitable for use in the production of (meth)acrolein

or

(meth)acrylic acid from propane through vapor-phase catalytic oxidation

ST propane vapor phase oxidn catalyst acrylic acid prepn; molybdenum vanadium titanium antimony tellurium oxide oxidn catalyst alkane

IT Oxidation catalysts

(gas-phase; high-activity oxidation catalysts for alkanes for preparation of (meth)acrolein or (meth)acrylic acid)

IT Alkanes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(high-activity oxidation catalysts for alkanes for preparation of oxygen-containing unsatd. compds.)

IT 107-02-8P, Acrolein, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(high-activity oxidation catalysts for propane for preparation of acrolein)

IT 202523-10-2P 380413-67-2P 380413-74-1P 439936-04-6P

439936-05-7P 439936-06-8P 439936-07-9P 439936-08-0P 439936-09-1P

439936-10-4P 439936-11-5P

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP

(Preparation); USES (Uses)

(high-activity oxidation catalysts for propane for preparation of acrylic acid)

IT 79-10-7P, Acrylic acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(high-activity oxidation catalysts for propane for preparation of acrylic acid)

IT 74-98-6, Propane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(high-activity oxidation catalysts for propane for preparation of acrylic acid)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Mitsubishi Chemical Corp; JP 1017523 A 1998

(2) Mitsubishi Chemical Corp; JP 10195036 A 1998 HCAPLUS

(3) Mitsubisi Rayon Co Ltd; JP 200288012 A 2002

(4) Mitsubisi Rayon Co Ltd; JP 200288013 A 2002

(5) Nippon Shokubai Co Ltd; JP 08206504 A 1996 HCAPLUS

(6) Nippon Shokubai Co Ltd; US 5739392 A 1996 HCAPLUS

(7) Nippon Shokubai Co Ltd; EP 711745 A1 1996 HCAPLUS

L37 ANSWER 10 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2002:252973 HCAPLUS

DN 136:279834

ED Entered STN: 05 Apr 2002

TI Promoted multi-metal oxide oxidation or ammoxidation catalysts

IN Chaturvedi, Sanjay; Gaffney, Anne Mae; Han, Scott; Heffner,

Michele Doreen; Song, Ruozhi

PA Rohm and Haas Company, USA

SO Eur. Pat. Appl., 20 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM B01J023-28

ICS B01J023-00; C07C253-24; C07C051-215; B01J027-057

CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1192988	A1	20020403	EP 2001-308129	20010925 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	US 2002062042	A1	20020523	US 2001-928030	20010811 <--
	US 6407031	B2	20020618		
	CN 1346700	A	20020501	CN 2001-140940	20010927 <--
	BR 2001004322	A	20020507	BR 2001-4322	20010927 <--
	JP 2002159855	A2	20020604	JP 2001-297319	20010927 <--
	US 2002143208	A1	20021003	US 2002-95612	20020312 <--
	US 6825380	B2	20041130		
PRAI	US 2000-235982P	P	20000928	<--	
	US 2000-235983P	P	20000928	<--	
	US 2000-236073P	P	20000928	<--	
	US 2000-236250P	P	20000928	<--	
	US 2000-236305P	P	20000928	<--	
	US 2001-928030	A	20010811	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1192988	ICM	B01J023-28
	ICS	B01J023-00; C07C253-24; C07C051-215; B01J027-057
EP 1192988	ECLA	B01J023/22; B01J023/28; B01J027/057T; C07C253/24 <--
US 2002062042	NCL	502/311.000; 502/309.000; 502/312.000; 502/322.000; 556/042.000; 556/047.000
	ECLA	B01J023/22; B01J023/28; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
US 2002143208	NCL	562/542.000; 502/215.000; 502/302.000; 502/304.000; 502/309.000; 502/311.000; 502/312.000; 558/303.000; 558/318.000; 558/319.000; 558/320.000; 562/544.000; 562/549.000
	ECLA	B01J023/22; B01J023/28; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane or a mixture of an alkane and an alkene to an unsatd. nitrile. The catalyst comprises  $\geq 1$  element selected from the group consisting of Sc, Y, Pr, Nd and Tb. Thus, ammonium heptamolybdate tetrahydrate 12.93, ammonium metavanadate 2.55, telluric acid 3.87, and praseodymium nitrate 1.26 g were dissolved in water 70°, 61.92 g aqueous niobium oxalate containing 1.36% Nb in 1.43 g of oxalic acid was added at 40°, water was removed at 50° and 28 mm Hg to obtain 23 g of a precursor solid which was calcined in a quartz tube. to give a catalyst with nominal composition  $\text{Mo}_{1.0}\text{V}_{0.3}\text{Te}_{0.23}\text{Nb}_{0.08}\text{Pr}_{0.04}\text{O}_x$ , which was used as an oxidation catalyst

of propane to produce acrylic acid.

ST metal oxide oxidn ammoxidn catalyst nitrile carboxylic acid prepn

IT Ammoxidation **catalysts**

Oxidation **catalysts**

(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

IT Alkanes, reactions

Alkenes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

IT Carboxylic acids, preparation



## Nitriles, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(unsatd.; promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

IT 144-62-7, Oxalic acid, uses 7440-27-9, Terbium, uses 7803-55-6  
 10361-80-5, Praseodymium nitrate 11120-48-2, Telluric acid 12054-85-2  
 13465-60-6, Scandium nitrate 13494-98-9, Yttrium nitrate hexahydrate  
 16454-60-7 21348-59-4, Niobium oxalate

RL: CAT (Catalyst use); USES (Uses)

(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

IT 224324-37-2P, Molybdenum neodymium niobium tellurium vanadium  
 oxide 224324-51-0P, Molybdenum niobium praseodymium tellurium  
 vanadium oxide 224324-60-1P, Molybdenum niobium tellurium  
 terbium vanadium oxide 224324-73-6P, Molybdenum niobium scandium  
 tellurium vanadium oxide 406675-58-9P

RL: CAT (Catalyst use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

IT 79-10-7P, Acrylic acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

IT 74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Asahi Chemical Ind; DE 19847656 A 1999 HCAPLUS
- (2) Mitsubishi Chem Corp; EP 0970942 A 2000 HCAPLUS
- (3) Rohm & Haas; EP 0962253 A 1999 HCAPLUS

L37 ANSWER 11 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2002:252972 HCAPLUS

DN 136:279833

ED Entered STN: 05 Apr 2002

TI Promoted multi-metal oxide oxidation or ammoxidation catalysts

IN Chaturvedi, Sanjay; Gaffney, Anne Mae; Han, Scott; Le, Hung Nhu  
 Dominique; Song, Ruozhi; Heffner, Michele Doreen; Vickery, Elsie  
 Mae

PA Rohm and Haas Company, USA

SO Eur. Pat. Appl., 24 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM B01J023-00

ICS B01J023-28; B01J027-057; C07C253-24; C07C051-215

CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1192987	A1	20020403	EP 2001-308131	20010925 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	US 2002065431	A1	20020530	US 2001-928197	20010810 <--
	US 6407280	B1	20020618		
	BR 2001004285	A	20020507	BR 2001-4285	20010927 <--
	CN 1347756	A	20020508	CN 2001-140941	20010927 <--

JP 2002177784	A2	20020625	JP 2001-300840	20010928 <--
US 6504053	B1	20030107	US 2002-144924	20020514 <--
PRAI US 2000-235979P	P	20000928	<--	
US 2000-235984P	P	20000928	<--	
US 2000-236000P	P	20000928	<--	
US 2000-236130P	P	20000928	<--	
US 2001-286219P	P	20010425	<--	
US 2001-928197	A	20010810	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1192987	ICM	B01J023-00
	ICS	B01J023-28; B01J027-057; C07C253-24; C07C051-215
EP 1192987	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J023/652D; B01J023/68M4; B01J023/887K; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
US 2002065431	NCL	558/319.000; 502/309.000; 502/310.000; 502/311.000; 502/344.000; 558/318.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J023/652D; B01J023/68M4; B01J023/887K; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
US 6504053	NCL	562/549.000; 502/309.000; 502/310.000; 562/547.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J023/652D; B01J023/68M4; B01J023/887K; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
AB		A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane or a mixture of an alkane and an alkene to an unsatd. nitrile. The multi-metal oxide catalyst comprises at least one element selected from the group consisting of Ni, Pd, Cu, Ag and Au.
ST		metal oxide oxidn ammoxidn catalyst carboxylic acid prepn
IT		<b>Ammoxidation catalysts</b> <b>Oxidation catalysts</b> (promoted multi-metal oxide oxidation or ammoxidn. catalysts for preparation of carboxylic acids or nitriles from alkanes and/or alkenes)
IT		Alkanes, reactions Alkenes, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (promoted multi-metal oxide oxidation or ammoxidn. catalysts for preparation of carboxylic acids or nitriles from alkanes and/or alkenes)
IT		Carboxylic acids, preparation Nitriles, preparation RL: IMF (Industrial manufacture); PREP (Preparation) (unsatd.; promoted multi-metal oxide oxidation or ammoxidn. catalysts for preparation of carboxylic acids or nitriles from alkanes and/or alkenes)
IT		144-62-7, Oxalic acid, uses 7761-88-8, Silver nitrate, uses 7803-55-6, Ammonium metavanadate 10102-05-3, Palladium nitrate 11120-48-2, Telluric acid 12054-85-2 13478-00-7, Nickel nitrate hexahydrate 21348-59-4, Niobium oxalate 31113-23-2 33971-89-0 RL: CAT (Catalyst use); USES (Uses) (promoted multi-metal oxide oxidation or ammoxidn. catalysts for preparation of carboxylic acids or nitriles from alkanes and/or alkenes)
IT		146569-48-4P, Molybdenum niobium tellurium vanadium oxide 146569-69-9P, Molybdenum nickel niobium tellurium vanadium oxide 149920-42-3P, Molybdenum niobium palladium tellurium vanadium oxide 406681-66-1P 406681-67-2P 406681-68-3P

RL: CAT (Catalyst use); IMF (Industrial manufacture);  
PREP (Preparation); USES (Uses)

(promoted multi-metal oxide oxidation or ammoxidn. catalysts for  
preparation of

carboxylic acids or nitriles from alkanes and/or alkenes)

IT 79-10-7P, Acrylic acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(promoted multi-metal oxide oxidation or ammoxidn. catalysts for  
preparation of

carboxylic acids or nitriles from alkanes and/or alkenes)

IT 74-98-6, Propane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(promoted multi-metal oxide oxidation or ammoxidn. catalysts for  
preparation of

carboxylic acids or nitriles from alkanes and/or alkenes)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Komada, S; US 6063728 A 2000 HCAPLUS

(2) Mitsubishi Chem Corp; EP 0767164 A 1997 HCAPLUS

(3) Mitsubishi Chem Corp; EP 0970942 A 2000 HCAPLUS

(4) Nitto Chemical Industry Co Ltd; EP 0404529 A 1990 HCAPLUS

(5) Umezawa, T; US 5231214 A 1993 HCAPLUS

L37 ANSWER 12 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2002:252971 HCAPLUS

DN 136:279832

ED Entered STN: 05 Apr 2002

TI Iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidation catalysts

IN Chaturvedi, Sanjay; Gaffney, Anne Mae; Han, Scott; Heffner,  
Michele Doreen; Song, Ruozhi

PA Rohm and Haas Company, USA

SO Eur. Pat. Appl., 18 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM B01J023-00

ICS B01J023-28; B01J023-46; B01J027-057; C07C253-24; C07C051-215

CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1192986	A1	20020403	EP 2001-308128	20010925 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	US 2002062038	A1	20020523	US 2001-927288	20010810 <--
	US 6734136	B2	20040511		
	CN 1346701	A	20020501	CN 2001-140943	20010927 <--
	BR 2001004337	A	20020611	BR 2001-4337	20010927 <--
	TW 592801	B	20040621	TW 2001-90123902	20010927 <--
	JP 2002159858	A2	20020604	JP 2001-299122	20010928 <--
	US 2003204111	A1	20031030	US 2003-430599	20030507 <--
	US 6790988	B2	20040914		
PRAI	US 2000-235980P	P	20000928	<--	
	US 2000-235981P	P	20000928	<--	
	US 2000-236143P	P	20000929	<--	
	US 2001-927288	A	20010810	<--	

CLASS

PATENT NO. CLASS PATENT FAMILY CLASSIFICATION CODES

EP 1192986 ICM B01J023-00  
ICS B01J023-28; B01J023-46; B01J027-057; C07C253-24;  
C07C051-215

EP 1192986 ECLA B01J023/00B; B01J023/652D; B01J027/057T;  
C07C051/215+57/04; C07C051/25B+57/04; C07C253/24;  
B01J023/10; B01J023/20; B01J023/28 <--

US 2002062038 NCL 502/215.000; 502/304.000; 502/312.000; 562/542.000  
ECLA B01J023/00B; B01J023/10; B01J023/20; B01J023/28;  
B01J023/652D; B01J027/057T; C07C051/215+57/04;  
C07C051/25B+57/04; C07C253/24 <--

US 2003204111 NCL 562/542.000; 502/215.000; 502/302.000; 502/304.000;  
502/312.000; 562/547.000  
ECLA B01J023/00B; B01J023/10; B01J023/20; B01J023/28;  
B01J023/652D; B01J027/057T; C07C051/215+57/04;  
C07C051/25B+57/04; C07C253/24 <--

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor  
phase oxidation of an alkane or a mixture of an alkane and an alkene to an  
unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane or  
a mixture of an alkane and an alkene to an unsatd. nitrile. The multi-metal  
catalyst contains Ir and/or Sm. Thus, ammonium heptamolybdate  
tetrahydrate (1.0 M Mo), ammonium metavanadate (0.3 M V), and telluric  
acid (0.23 Te), were agitated in water at 70°, niobium oxalate  
(0.25 M Nb), oxalic acid (0.31 M), and iridium in 5% nitric acid (10,000  
µg/mL) were added to give Ir<sub>0.005</sub>Mo<sub>1</sub>V<sub>0.3</sub>Te<sub>0.23</sub>Nb<sub>0.125</sub>Ox.

ST iridium samarium oxide oxidn ammoxidn catalyst acrylic acid prepn

IT Ammoxidation catalysts  
Oxidation catalysts  
(iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidn. catalysts)

IT Alkanes, reactions  
Alkenes, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidn. catalysts)

IT Carboxylic acids, preparation  
Nitriles, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(unsatd.; iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidn. catalysts)

IT 144-62-7, Oxalic acid, uses 7439-88-5, Iridium, uses 7440-19-9,  
Samarium, uses 7647-01-0, Hydrochloric acid, uses 7697-37-2, Nitric  
acid, uses 7803-55-6 11120-48-2, Telluric acid 12054-85-2  
21348-59-4, Niobium oxalate  
RL: CAT (Catalyst use); USES (Uses)  
(iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidn. catalysts)

IT 224324-44-1P, Molybdenum niobium samarium tellurium vanadium oxide  
406675-66-9P 406675-67-0P  
RL: CAT (Catalyst use); IMF (Industrial manufacture);  
PREP (Preparation); USES (Uses)  
(iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidn. catalysts)

IT 79-10-7P, Acrylic acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidn. catalysts)

IT 74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(iridium and/or samarium promoted multi-metal oxide oxidation and  
ammoxidn. catalysts)

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE

- (1) Asahi Chemical Ind; DE 19847656 A 1999 HCAPLUS
- (2) Cassidy, T; US 6043185 A 2000 HCAPLUS
- (3) Nitto Chemical Industry Co; EP 0475351 A 1992 HCAPLUS
- (4) Rohm & Haas; EP 0962253 A 1999 HCAPLUS

L37 ANSWER 13 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2002:252970 HCAPLUS  
DN 136:279831  
ED Entered STN: 05 Apr 2002  
TI Halogen promoted multi-metal oxide oxidation and ammoxidation catalysts  
IN Chaturvedi, Sanjay; **Gaffney, Anne Mae**; Han, Scott; Heffner, Michele Doreen; **Song, Ruozhi**  
PA **Rohm and Haas Company, USA**  
SO Eur. Pat. Appl., 19 pp.  
CODEN: EPXXDW  
DT Patent  
LA English  
IC ICM B01J023-00  
ICS B01J023-28; B01J027-057; B01J027-132; C07C253-24; C07C051-215  
CC 35-2 (Chemistry of Synthetic High Polymers)  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1192984	A1	20020403	EP 2001-308121	20010925 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	US 2002058835	A1	20020516	US 2001-927941	20010810 <--
	US 6461996	B2	20021008		
	CN 1346699	A	20020501	CN 2001-140930	20010927 <--
	BR 2001004319	A	20020604	BR 2001-4319	20010927 <--
	TW 574070	B	20040201	TW 2001-90123927	20010927 <--
	JP 2003053190	A2	20030225	JP 2001-315888	20011012 <--
	US 2003018208	A1	20030123	US 2002-225709	20020822 <--
	US 6624111	B2	20030923		
	US 2003176734	A1	20030918	US 2003-444599	20030522 <--
	US 6747168	B2	20040608		
PRAI	US 2000-235977P	P	20000928	<--	
	US 2000-236261P	P	20000928	<--	
	US 2000-236262P	P	20000928	<--	
	US 2000-236263P	P	20000928	<--	
	US 2001-927041	A	20010810	<--	
	US 2001-927941	A	20010810	<--	
	US 2002-225709	A3	20020822	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1192984	ICM	B01J023-00
	ICS	B01J023-28; B01J027-057; B01J027-132; C07C253-24; C07C051-215
EP 1192984	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J027/057T; B01J027/132; C07C051/215; C07C051/25; C07C253/24 <--
US 2002058835	NCL	502/312.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J027/057T; B01J027/132; C07C051/215; C07C051/25; C07C253/24 <--
US 2003018208	NCL	502/312.000; 502/311.000; 562/549.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J027/057T; B01J027/132; C07C051/215; C07C051/25; C07C253/24 <--
US 2003176734	NCL	558/319.000

ECLA B01J023/00B; B01J023/20; B01J023/28; B01J027/057T;  
B01J027/132; C07C051/215; C07C051/25; C07C253/24 <--

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane or a mixture of an alkane and an alkene to an unsatd. nitrile. The catalyst comprises an element selected from the group consisting of Br, Cl, F and I. Thus, ammonium heptamolybdate tetrahydrate (1.0 M Mo), ammonium metavanadate (0.3 M V), and telluric acid (0.23 Te) were dissolved in water at 70°, aqueous niobium oxalate (0.25 M Nb), oxalic acid (0.31 M), and aqueous molybdenum(III) bromide (0.033 M) were added to give a catalyst having a nominal composition of Br0.01MolV0.3Te0.23Nb0.125 Ox.

ST halogen metal oxide oxidn ammoxidn catalyst acrylic acid prepn

IT Ammoxidation **catalysts**

Oxidation **catalysts**

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

IT Alkanes, reactions

Alkenes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

IT Carboxylic acids, preparation

Nitriles, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(unsatd.; halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

IT 144-62-7, Oxalic acid, uses 7803-55-6 10049-12-4, Vanadium trifluoride  
10241-05-1, Molybdenum(V) chloride 11120-48-2, Telluric acid  
12054-85-2 13446-57-6, Molybdenum(III) bromide 15513-94-7, Vanadium  
triiodide 21348-59-4, Niobium oxalate

RL: CAT (Catalyst use); USES (Uses)

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

IT 406675-79-4P 406675-80-7P 406675-81-8P

406675-82-9P

RL: CAT (Catalyst use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

IT 79-10-7P, Acrylic acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

IT 74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Mitsubishi Rayon Co; EP 0267556 A 1988 HCAPLUS

(2) Standard Oil Co; GB 1578280 A 1980 HCAPLUS

L37 ANSWER 14 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2002:252969 HCAPLUS

DN 136:279830

ED Entered STN: 05 Apr 2002

TI Indium promoted multi-metal oxide oxidation and ammoxidation catalyst

IN Chaturvedi, Sanjay; Gaffney, Anne Mae; Han, Scott; Vickery,  
Elsie Mae

PA Rohm and Haas Company, USA

SO Eur. Pat. Appl., 19 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM B01J023-00

ICS B01J023-28; B01J027-057; B01J023-36; B01J023-62; C07C253-24;  
C07C051-215

CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1192983	A1	20020403	EP 2001-308115	20010925 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	US 2002058836	A1	20020516	US 2001-928020	20010810 <--
	US 6403525	B2	20020611		
	CN 1346702	A	20020501	CN 2001-140929	20010927 <--
	BR 2001004323	A	20020604	BR 2001-4323	20010927 <--
	TW 224026	B1	20041121	TW 2001-90123929	20010927 <--
	JP 2002316053	A2	20021029	JP 2001-315793	20011012 <--
	US 2002133044	A1	20020919	US 2002-95633	20020312 <--
	US 6797840	B2	20040928		
PRAI	US 2000-236112P	P	20000928	<--	
	US 2001-283245P	P	20010412	<--	
	US 2001-928020	A	20010810	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1192983	ICM	B01J023-00
	ICS	B01J023-28; B01J027-057; B01J023-36; B01J023-62; C07C253-24; C07C051-215
EP 1192983	ECLA	B01J023/00B; B01J023/08; B01J023/28; B01J023/36; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
US 2002058836	NCL	502/311.000; 502/309.000; 502/310.000; 502/312.000; 556/042.000; 556/047.000
	ECLA	B01J023/00B; B01J023/08; B01J023/28; B01J023/36; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--
US 2002133044	NCL	562/542.000; 502/215.000; 502/304.000; 502/312.000
	ECLA	B01J023/00B; B01J023/08; B01J023/28; B01J023/36; B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04; C07C253/24 <--

AB A catalyst comprising an indium promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, to an unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane, or a mixture of an alkane and an alkene, to an unsatd. nitrile. Thus, ammonium heptamolybdate tetrahydrate 34.00, ammonium metavanadate 6.69, telluric acid 10.07, and In(NO<sub>3</sub>)<sub>3</sub>·5H<sub>2</sub>O 0.75 g were dissolved in water at 80° 155.93 g aqueous niobium oxalate was added at 20° to give a catalyst of nominal composition Mo<sub>1.0</sub>V<sub>0.3</sub>Te<sub>0.23</sub>Nb<sub>0.08</sub>In<sub>0.001</sub>Ox.

ST indium metal oxidn ammoxidn nitrile catalyst carboxylic acid prepn; rhenium mixed metal oxide oxidn catalyst acrylic acid prepn

IT Ammoxidation **catalysts**

Oxidation **catalysts**

(promoted multi-metal oxide oxidation catalyst)

IT Alkanes, reactions

Alkenes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(promoted multi-metal oxide oxidation catalyst)

IT Carboxylic acids, preparation

Nitriles, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(unsatd.; promoted multi-metal oxide oxidation catalyst)

IT 7803-55-6 11120-48-2, Telluric acid 12054-85-2 13598-65-7, Ammonium

perrhenate 13770-61-1, Indium trinitrate 21348-59-4, Niobium oxalate  
 RL: CAT (Catalyst use); USES (Uses)  
 (promoted multi-metal oxide oxidation catalyst)

IT 406675-87-4P 406675-88-5P  
 RL: CAT (Catalyst use); IMF (Industrial manufacture);  
 PREP (Preparation); USES (Uses)  
 (promoted multi-metal oxide oxidation catalyst)

IT 79-10-7P, Acrylic acid, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (promoted multi-metal oxide oxidation catalyst)

IT 74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (promoted multi-metal oxide oxidation catalyst)

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 RE  
 (1) Komada, S; US 5907052 A 1999 HCAPLUS  
 (2) Komada, S; US 6063728 A 2000 HCAPLUS  
 (3) Mitsubishi Chem Ind; EP 0512846 A 1992 HCAPLUS  
 (4) Rohm & Haas; EP 0962253 A 1999 HCAPLUS

L37 ANSWER 15 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2002:252968 HCAPLUS  
 DN 136:279829  
 ED Entered STN: 05 Apr 2002  
 TI Zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidation  
 catalyst  
 IN Chaturvedi, Sanjay; Gaffney, Anne Mae; Han, Scott; Le, Hung Nhu  
 Dominique  
 PA Rohm and Haas Company, USA  
 SO Eur. Pat. Appl., 22 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM B01J023-00  
 ICS B01J023-28; B01J027-057; B01J023-06; B01J023-08; C07C253-24;  
 C07C051-215  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1192982	A1	20020403	EP 2001-308114	20010925 <--
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
US 2002072629	A1	20020613	US 2001-928019	20010810 <--
US 6589907	B2	20030708		
CN 1347755	A	20020508	CN 2001-140931	20010927 <--
BR 2001004321	A	20020604	BR 2001-4321	20010927 <--
JP 2002159857	A2	20020604	JP 2001-297738	20010927 <--
TW 592808	B	20040621	TW 2001-90123930	20010927 <--
US 2003191336	A1	20031009	US 2003-430194	20030506 <--
US 6700015	B2	20040302		
PRAI US 2000-235978P	P	20000928	<--	
US 2000-236129P	P	20000928	<--	
US 2000-236260P	P	20000928	<--	
US 2001-928019	A	20010810	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1192982	ICM	B01J023-00
	ICS	B01J023-28; B01J027-057; B01J023-06; B01J023-08;



EP 1192982 ECLA C07C253-24; C07C051-215  
 B01J023/00B; B01J023/06; B01J023/08; B01J023/28;  
 B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04;  
 C07C253/24 <--

US 2002072629 NCL 502/311.000; 558/318.000; 558/319.000  
 ECLA B01J023/00B; B01J023/06; B01J023/08; B01J023/28;  
 B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04;  
 C07C253/24 <--

US 2003191336 NCL 562/512.200; 502/311.000  
 ECLA B01J023/00B; B01J023/06; B01J023/08; B01J023/28;  
 B01J027/057T; C07C051/215+57/04; C07C051/25B+57/04;  
 C07C253/24 <--

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane or a mixture of an alkane and an alkene to an unsatd. nitrile. The mixed metal oxide comprises zinc and/or gallium. Thus, ammonium heptamolybdate tetrahydrate 13.06, ammonium metavanadate 2.60, telluric acid 3.91, and zinc nitrate hexahydrate 1.32 g were dissolved in 100 g water at 80°, 59.11 g aqueous niobium oxalate containing 0.93 % Nb was mixed at 20° to give a catalyst of nominal composition  
 $\text{Mo}_{1.0}\text{V}_{0.03}\text{Te}_{0.23}\text{Nb}_{0.08}\text{Zn}_{0.06}\text{O}_x$ .

ST zinc gallium oxide oxidn ammoxidn catalyst carboxylic acid prepn  
 IT Carboxylic acids, preparation  
 Nitriles, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (unsatd.; zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

IT Ammoxidation catalysts  
 Oxidation catalysts  
 (zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

IT Alkanes, reactions  
 Alkenes, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

IT 7803-55-6, Ammonium metavanadate 10196-18-6, Zinc nitrate hexahydrate 11120-48-2, Telluric acid 12024-21-4, Gallium oxide 12054-85-2 13494-90-1, Gallium nitrate ( $\text{Ga}(\text{NO}_3)_3$ ) 21348-59-4, Niobium oxalate  
 RL: CAT (Catalyst use); USES (Uses)  
 (zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

IT 406675-48-7P 406675-49-8P 406675-50-1P  
 RL: CAT (Catalyst use); IMF (Industrial manufacture);  
 PREP (Preparation); USES (Uses)  
 (zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

IT 79-10-7P, Acrylic acid, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

IT 74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 RE  
 (1) Cassidy, T; US 6043185 A 2000 HCAPLUS  
 (2) Karim, K; WO 0029106 A 2000 HCAPLUS

- (3) Karim, K; US 6114278 A 2000 HCAPLUS  
 (4) Komada, S; US 5907052 A 1999 HCAPLUS  
 (5) Komada, S; US 6063728 A 2000 HCAPLUS  
 (6) Rohm & Haas; EP 0962253 A 1999 HCAPLUS

L37 ANSWER 16 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2001:923667 HCAPLUS  
 DN 136:38031  
 ED Entered STN: 21 Dec 2001  
 TI Catalysts for vapor-phase catalytic oxidation or vapor-phase catalytic  
 ammoxidation of propane or isobutane  
 IN Komada, Satoru; Hinago, Hidenori; Watanabe, Mamoru  
 PA Asahi Kasei Kabushiki Kaisha, Japan; Nagano, Osamu  
 SO PCT Int. Appl., 98 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA Japanese  
 IC ICM B01J023-28  
 ICS B01J023-30; B01J023-88; B01J023-32; C07C253-24; C07C255-08;  
 C07C051-215; C07C057-05; C07B061-00  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 24, 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001096016	A1	20011220	WO 2001-JP5055	20010614 <--
	W: CN, DE, ID, JP, KR, US				
	DE 10195967	T	20030522	DE 2001-10195967	20010614 <--
	US 2003088118	A1	20030508	US 2002-231113	20020830 <--
PRAI	JP 2000-179687	A	20000615	<--	
	WO 2001-JP5055	W	20010614	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2001096016	ICM	B01J023-28
	ICS	B01J023-30; B01J023-88; B01J023-32; C07C253-24; C07C255-08; C07C051-215; C07C057-05; C07B061-00
WO 2001096016	ECLA	B01J023/00B; B01J023/18; B01J023/20; B01J023/28; B01J023/887K; B01J027/057T; C07C051/215; C07C051/215+57/04; C07C253/24 <--
US 2003088118	NCL	558/332.000; 502/215.000; 502/309.000; 502/312.000
	ECLA	B01J023/00B; B01J023/18; B01J023/20; B01J023/28; B01J023/887K; B01J027/057T; C07C051/215; C07C051/215+57/04; C07C253/24 <--
AB		An oxide catalyst comprises Mo1VaNbXcYdZeQfOn [wherein X is ≥1 element selected between Te and Sb, Y is ≥1 element selected between Al and W, Z is ≥1 element forming a rutile-form oxide (in catalyst production, a rutile-form oxide of element Z is used as a material for Z), Q is ≥1 element selected from the group consisting of Ti, Sn, Ge, Pb, Ta, Ru, Re, Rh, Ir, Pt, Cr, Mn, Tc, Os, Fe, As, Ce, Co, Mg, Ni, and Zn (in catalyst production, a compound of element Q not having a rutile-form structure is used as a material for Q), and a-e and n represent the atomic ratios of V, Nb, X, Y, Z, and O, resp., to Mo] and is used to produce an unsatd. carboxylic acid or unsatd. nitrile. Thus, propane was ammoxidized in a fluidized bed reactor at 440° over Mo1V0.32Nb0.07Sb0.23Ti0.35On on 43.2% SiO2 to prepare acrylonitrile at selectivity 64.2% and propane conversion 50.8%.
ST		propane isobutane oxidn ammoxidn catalyst; metal oxide propane oxidn catalyst; acrylonitrile manuf catalyst; molybdenum vanadium niobium oxidn ammoxidn catalyst

- IT Ammoxidation catalysts  
Catalyst supports  
Oxidation catalysts  
(catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)
- IT Oxides (inorganic), preparation  
RL: CAT (Catalyst use); CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process); USES (Uses)  
(catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)
- IT Carboxylic acids, uses  
RL: CAT (Catalyst use); USES (Uses)  
(dicarboxylic; catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)
- IT 144-62-7, Oxalic acid, uses 1309-64-4, Antimony oxide, uses 1317-80-2, Rutile 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 7803-55-6, Ammonium metavanadate 10421-48-4 11120-48-2, Telluric acid 12027-67-7, Ammonium heptamolybdate 12028-48-7, Ammonium metatungstate 13473-90-0, Aluminum nitrate 18282-10-5, Tin dioxide 37349-30-7, Niobic acid  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)
- IT 148047-77-2P, Antimony iron oxide (SbFeO<sub>3</sub>) **198018-04-1P**  
**380413-67-2P** 380413-68-3P 380413-69-4P 380413-70-7P  
380413-71-8P, Aluminum antimony oxide (AlSbO<sub>3</sub>) 380413-72-9P, Aluminum antimony oxide (Al<sub>1.2</sub>SbO<sub>3.3</sub>) **380413-74-1P**  
RL: CAT (Catalyst use); CPS (Chemical process); **IMF (Industrial manufacture)**; PEP (Physical, engineering or chemical process); **PREP (Preparation)**; PROC (Process); USES (Uses)  
(catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)
- IT 79-10-7P, Acrylic acid, preparation 107-13-1P, Acrylonitrile, preparation  
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
(catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)
- IT 79-41-4P, Methacrylic acid, preparation 126-98-7P, Methacrylonitrile  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)
- IT 74-98-6, Propane, reactions 75-28-5, Isobutane 7664-41-7, Ammonia, reactions 7722-84-1, Hydrogen peroxide, reactions 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Asahi Chemical Industry Co Ltd; JP 200012599 A 2000
- (2) Mitsubishi Chemical Corporation; JP 1028862 A 1998
- (3) R P Fiber & Resin Intermediates; JP 08238428 A 1997 HCAPLUS
- (4) R P Fiber & Resin Intermediates; CN 1134854 A 1997 HCAPLUS
- (5) R P Fiber & Resin Intermediates; ES 2138798 T 1997 HCAPLUS
- (6) R P Fiber & Resin Intermediates; CA 2167880 A 1997 HCAPLUS
- (7) R P Fiber & Resin Intermediates; FR 2729651 A 1997 HCAPLUS
- (8) R P Fiber & Resin Intermediates; SG 35487 A 1997
- (9) R P Fiber & Resin Intermediates; US 5663392 A 1997 HCAPLUS

- (10) R P Fiber & Resin Intermediates; DE 69603377 C 1997
- (11) R P Fiber & Resin Intermediates; EP 723934 A1 1997 HCAPLUS
- (12) Rhone-Poulenc Chimie; CN 1120973 A 1997 HCAPLUS
- (13) Rhone-Poulenc Chimie; CA 2152464 A1 1997 HCAPLUS
- (14) Rhone-Poulenc Chimie; FR 2721598 A 1997 HCAPLUS
- (15) Rhone-Poulenc Chimie; SG 45104 A 1997
- (16) Rhone-Poulenc Chimie; US 5686381 A 1997 HCAPLUS
- (17) Rhone-Poulenc Chimie; EP 691306 A1 1997 HCAPLUS
- (18) Rhone-Poulenc Chimie; DE 69503985 C 1997
- (19) Rhone-Poulenc Chimie; JP 8996 A 1997
- (20) Rhone Poulenc Fiber And Resin Intermediates; JP 2000500699 A 2000
- (21) Rhone Poulenc Fiber And Resin Intermediates; CA 2239102 A 2000 HCAPLUS
- (22) Rhone Poulenc Fiber And Resin Intermediates; FR 2742678 A1 2000 HCAPLUS
- (23) Rhone Poulenc Fiber And Resin Intermediates; US 6200926 B1 2000 HCAPLUS
- (24) Rhone Poulenc Fiber And Resin Intermediates; WO 9723287 A1 2000 HCAPLUS
- (25) Toagosei Co Ltd; JP 2000317309 A 2000 HCAPLUS

L37 ANSWER 17 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2001:855682 HCAPLUS

DN 136:6499

ED Entered STN: 27 Nov 2001

TI Manufacture of molybdenum- and vanadium-containing mixed oxides as  
gas-phase oxidation catalysts and preparation of nitriles and  
 $\alpha,\beta$ -unsaturated carboxylic acid from alkanes using them

IN Tsuji, Hideto

PA Mitsubishi Chemical Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C01G039-00

ICS B01J023-28; B01J027-057; C07C051-215; C07C057-05; C07C057-055;  
C07C253-24; C07C255-08; C07B061-00

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 23, 57

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001328812	A2	20011127	JP 2000-147776	20000519 <--
PRAI	JP 2000-147776		20000519	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001328812	ICM	C01G039-00
	ICS	B01J023-28; B01J027-057; C07C051-215; C07C057-05; C07C057-055; C07C253-24; C07C255-08; C07B061-00

AB The Mo- and V-containing mixed oxides are manufactured by addition of strong  
acids to

liquid media containing source compds., followed by drying and firing.

Nitriles

are prepared by contact oxidation of alkanes in the presence of the above mixed  
oxides as catalysts.  $\alpha,\beta$ -Unsatd. carboxylic acids are prepared  
by gas-phase oxidation of alkanes in the presence of the above mixed oxides  
as catalysts. Thus, reaction of propane/ $\text{NH}_3$ /air 1/1.2/15 gases in the  
presence of  $\text{MoV}_0.3\text{Nb}_0.12\text{Te}_0.20\text{O}_x$  (prepared by treatment of ammonium  
paramolybdate, ammonium metavanadate, orthotelluric acid, and  $\text{Nb}_2\text{O}_5$  with  
10% aqueous  $\text{H}_2\text{SO}_4$  and drying and firing) gave acrylonitrile in 91.1%  
conversion and 50.2% yield.

ST molybdenum vanadium oxide contact oxidn catalyst alkane; nitrile prepn  
ammoxidn alkane; alpha beta unsatd carboxylic acid prepn oxidn alkane;

- acrylonitrile prepn ammoxidn propane; acrylic acid prepn gas phase oxidn propane
- IT Ammoxidation  
Ammoxidation catalysts  
Oxidation  
Oxidation catalysts  
(gas-phase; manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- IT Nitriles, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- IT Alkanes, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- IT Carboxylic acids, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
( $\alpha,\beta$ -unsatd.; manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- IT 146569-48-4P, Molybdenum niobium tellurium vanadium oxide  
149920-40-1P, Bismuth molybdenum niobium tellurium vanadium oxide  
193405-60-6P, Antimony molybdenum niobium vanadium oxide  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- IT 79-10-7P, Acrylic acid, preparation 107-13-1P, Acrylonitrile, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- IT 1304-76-3, Bismuth oxide (Bi<sub>2</sub>O<sub>3</sub>), processes 1309-64-4, Patox C, processes 1313-96-8, Niobium pentaoxide 7664-93-9, Sulfuric acid, processes 7697-37-2, Nitric acid, processes 7803-55-6, Ammonium metavanadate 7803-68-1, Orthotelluric acid 12027-67-7, Ammonium paramolybdate  
RL: PEP (Physical, engineering or chemical process); PROC (Process)  
(manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- IT 74-98-6, Propane, reactions 75-28-5, Isobutane  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(manufacture of Mo- and V-containing mixed oxides as gas-phase oxidation or ammoxidn. catalysts for preparation of nitriles and  $\alpha,\beta$ -unsatd. carboxylic acids from alkanes)
- L37 ANSWER 18 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2001:702440 HCAPLUS  
DN 135:242659  
ED Entered STN: 26 Sep 2001  
TI Highly active ammoxidation catalysts for manufacture of unsaturated nitriles from olefins and their manufacture

IN Mazhar, Abdulwahed; Khalid, El Yahyaoui  
 PA Syria  
 SO Jpn. Kokai Tokkyo Koho, 30 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM B01J023-31  
 ICS B01J037-04; C07C253-24; C07C255-08; C07B061-00  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 67

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001259420	A2	20010925	JP 2001-69672	20010313 <--
	EP 1155741	A1	20011121	EP 2001-106276	20010314 <--
	EP 1155741	B1	20030514		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
PRAI	US 2000-189215P	P	20000314	<--	

CLASS

	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
	JP 2001259420	ICM	B01J023-31
		ICS	B01J037-04; C07C253-24; C07C255-08; C07B061-00
	EP 1155741	ECLA	B01J023/31; C07C253/26 <--
AB	The catalysts containing bismuth, molybdenum, vanadium, antimony, and niobium are manufactured by (a) preparing a vanadium antimonate phase by heating a slurry of vanadium oxide and antimony oxide thereby forming a vanadium-antimony paste and subsequently drying the paste and calcining to form the vanadium antimonate phase; (b) preparing a niobium-molybdenum solution; (c) preparing bismuth, niobium, and molybdenum mixed oxide hydrates at room temperature and without heat treating the mixed oxide hydrates; (d) combining the vanadium antimonate phase, the mixed oxide hydrates and a support thereby forming a catalyst precursor mixture; (e) stirring the catalyst precursor mixture for a period of time sufficient to form a catalyst precursor paste; and (f) drying the catalyst precursor paste to form a dried catalyst precursor material and calcining the precursor to form the catalysts. Thus, BiMoV0.095Sb0.19Nb0.21Ox/50%SiO2 was prepared and used as catalysts for ammoxidn. of propylene to give 72.5% acrylonitrile with 85.4% selectivity.		
ST	ammoxidn catalyst antimony bismuth molybdenum niobium vanadium oxide; acrylonitrile manuf selectivity composite metal oxide catalyst; propylene ammoxidn composite metal oxide catalyst		
IT	Ammoxidation catalysts (manufacture of highly active ammoxidn. catalysts for manufacture of unsatd. nitriles from olefins)		
IT	253149-90-5P, Bismuth molybdenum niobium oxide RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent) (hydrate; manufacture of highly active ammoxidn. catalysts for manufacture of unsatd. nitriles from olefins)		
IT	115-07-1, Propylene, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (manufacture of highly active ammoxidn. catalysts for manufacture of acrylonitrile from)		
IT	260557-95-7P, Antimony bismuth molybdenum niobium vanadium oxide RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses) (manufacture of highly active ammoxidn. catalysts for manufacture of unsatd.		

nitrides from olefins)  
 IT 107-13-1P, Acrylonitrile, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (manufacture of highly active ammoxidn. catalysts for manufacture of unsatd. nitrides from olefins)  
 IT 37368-11-9P, Antimony Vanadium oxide  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (manufacture of highly active ammoxidn. catalysts for manufacture of unsatd. nitrides from olefins)  
 IT 1309-64-4, Antimony oxide (Sb<sub>2</sub>O<sub>3</sub>), reactions 1313-27-5, Molybdenum oxide (MoO<sub>3</sub>), reactions 1313-96-8, Niobium pentoxide 1314-62-1, Vanadium oxide (V<sub>2</sub>O<sub>5</sub>), reactions 10361-44-1, Bismuth trinitrate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of highly active ammoxidn. catalysts for manufacture of unsatd. nitrides from olefins)  
 IT 7631-86-9, Silica, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (supports; manufacture of highly active ammoxidn. catalysts for manufacture of unsatd. nitrides from olefins)

L37 ANSWER 19 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2001:594385 HCAPLUS  
 DN 135:167166  
 ED Entered STN: 16 Aug 2001  
 TI A process for preparing a catalyst and catalytic oxidation therewith  
 IN Lin, Manhwa  
 PA Rohm and Haas Company, USA  
 SO Eur. Pat. Appl., 12 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM B01J023-30  
 ICS B01J023-31; B01J027-057; C07C051-215; C07C057-04  
 CC 35-3 (Chemistry of Synthetic High Polymers)  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1123738	A1	20010816	EP 2001-300811	20010130 <--
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
US 2002010365	A1	20020124	US 2001-754942	20010104 <--
US 6693059	B2	20040217		
TW 575464	B	20040211	TW 2001-90102029	20010201 <--
CN 1310042	A	20010829	CN 2001-103218	20010207 <--
BR 2001000469	A	20010911	BR 2001-469	20010208 <--
JP 2001259427	A2	20010925	JP 2001-33797	20010209 <--
US 2004116739	A1	20040617	US 2003-731512	20031209 <--
PRAI US 2000-181412P	P	20000209	<--	
US 2001-754942	A3	20010104	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1123738	ICM	B01J023-30
	ICS	B01J023-31; B01J027-057; C07C051-215; C07C057-04
EP 1123738	ECLA	B01J023/30; B01J023/31; B01J027/057; B01J027/057T; C07C051/215; C07C051/215+57/04 <--
US 2002010365	NCL	502/308.000; 502/309.000; 502/311.000; 502/312.000; 502/313.000; 502/314.000; 502/315.000; 502/316.000;

502/321.000; 502/322.000; 502/353.000  
 ECLA B01J023/30; B01J027/057T; C07C045/33; C07C045/33+47/22;  
 C07C051/215+57/04 <--  
 US 2004116739 NCL 562/547.000; 562/546.000; 502/302.000  
 ECLA B01J023/30; B01J023/31; B01J027/057; B01J027/057T;  
 C07C045/33; C07C045/33+47/22; C07C051/215;  
 C07C051/215+57/04 <--  
 AB A process useful for the catalytic gas phase oxidation of alkanes to unsatd.  
 aldehydes or carboxylic acids uses catalysts of particular compns. formed  
 in a particular manner is disclosed. Thus, a catalyst comprising ammonium  
 metatungstate 36.26, ammonium metavanadate 4.80, telluric acid 7.22, and  
 ammonium niobium oxalate 169.4, g in water was calcined to give  
 W1V0.3Te0.23Nb0.12On and oxidized propane in the presence of air and  
 steam.  
 ST alkane oxidn catalyst prepn; carboxylic acid unsatd aldehyde producing  
 catalyst prepn; molybdenum niobium tellurium tungsten vanadium oxide contg  
 catalyst  
 IT Oxidation catalysts  
 (gas-phase; preparation of alkane oxidation catalyst)  
 IT Carboxylic acids, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (preparation of alkane oxidation catalyst)  
 IT Alkanes, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of alkane oxidation catalyst)  
 IT Aldehydes, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (unsatd.; preparation of alkane oxidation catalyst)  
 IT 7803-55-6, Ammonium metavanadate 11120-48-2, Telluric acid 12028-48-7,  
 Ammonium metatungstate 12054-85-2 12107-01-6  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (catalyst composition; preparation of alkane oxidation catalyst)  
 IT 160832-88-2P, Niobium tellurium tungsten vanadium oxide  
 204125-27-9P, Molybdenum niobium tellurium tungsten vanadium oxide  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
 (Preparation); USES (Uses)  
 (catalyst; preparation of alkane oxidation catalyst)  
 IT 115-07-1, Propylene, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of alkane oxidation catalyst)  
 IT 7732-18-5, Water, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (solvent; preparation of alkane oxidation catalyst)  
 RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 RE  
 (1) Guttman, A; US 4788317 A 1988 HCAPLUS  
 (2) Hoechst Ag; DE 19717076 A 1998 HCAPLUS  
 (3) Lyons, J; US 5990348 A 1999 HCAPLUS  
 (4) Standard Oil Co Ohio; EP 0389701 A 1990 HCAPLUS  
 L37 ANSWER 20 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2001:479330 HCAPLUS  
 DN 135:77251  
 ED Entered STN: 03 Jul 2001  
 TI Metal oxide catalysts and manufacture of acrylonitrile or  
 methacrylonitrile using them  
 IN Komata, Satoru; Inoue, Tomonari  
 PA Asahi Chemical Industry Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF



DT Patent  
 LA Japanese  
 IC ICM B01J023-36  
 ICS B01J023-28; C07C253-24; C07C255-08; C07B061-00  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 56

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001179094	A2	20010703	JP 1999-368712	19991227 <--
PRAI	JP 1999-368712		19991227	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001179094	ICM	B01J023-36
	ICS	B01J023-28; C07C253-24; C07C255-08; C07B061-00

AB The catalysts, used in gas phase catalytic ammoxidn. of propane or isobutane, comprise  $\text{Mo}_1\text{Va}_n\text{Nb}_b\text{Sb}_c\text{Zd}_d\text{On}$  ( $\text{Z} = \text{Re}, \text{Hf}$ ;  $a-n = \text{atomic ratio to Mo}$ ;  $a = 0.1-1$ ;  $b = 0.01-1$ ;  $c = 0.01-1$ ;  $d = 0.001-0.1$ ;  $n = \text{number determined}$

according to valence of component metals). Thus, 15%  $\text{H}_2\text{O}_2$  solution, an aqueous solution containing

niobium hydroxide oxide and  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ , and an aqueous solution containing  $\text{NH}_4\text{ReO}_4$  were successively added into an aqueous solution containing  $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$ ,  $\text{NH}_4\text{VO}_3$ ,  $\text{Sb}_2\text{O}_3$ , and silica sol, spray-dried, and sintered to give a catalyst comprising  $\text{Mo}_1\text{V}_0.33\text{Sb}_0.22\text{Nb}_0.07\text{Re}_0.02\text{On}$  supported on  $\text{SiO}_2$ . Propane was ammoxidized by using the catalyst to give acrylonitrile with selectivity 63.0 and 62.9% at conversion 49.7 and 49.3% after 500 and 1000 h, resp.

ST propane ammoxidn catalyst rhenium metal oxide; acrylonitrile manuf catalyst composite metal oxide; isobutane ammoxidn catalyst hafnium metal oxide; methacrylonitrile manuf catalyst composite metal oxide

IT Ammoxidation catalysts  
 (metal oxide catalysts for manufacture of acrylonitrile or methacrylonitrile)

IT Silica gel, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (supports; in manufacture of metal oxide catalysts for manufacture of acrylonitrile or methacrylonitrile)

IT 144-62-7, Oxalic acid, uses 7722-84-1, Hydrogen peroxide, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (in manufacture of metal oxide catalysts for manufacture of acrylonitrile or methacrylonitrile)

IT 1309-64-4, Antimony oxide ( $\text{Sb}_2\text{O}_3$ ), reactions 7803-55-6, Ammonium metavanadate 12027-67-7, Ammonium heptamolybdate 13598-65-7, Ammonium perrhenate 17475-67-1, Tetrakis(acetylacetonato)hafnium 37349-30-7, Niobium hydroxide oxide

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (in manufacture of metal oxide catalysts for manufacture of acrylonitrile or methacrylonitrile)

IT 347142-99-8P 347143-00-4P  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(metal oxide catalysts for manufacture of acrylonitrile or methacrylonitrile)

IT 107-13-1P, Acrylonitrile, preparation 126-98-7P, Methacrylonitrile  
 RL: IMF (Industrial manufacture); PREP (Preparation)

(metal oxide catalysts for manufacture of acrylonitrile or methacrylonitrile)

IT 74-98-6, Propane, reactions 75-28-5, Isobutane

RL: RCT (Reactant); RACT (Reactant or reagent)  
(metal oxide catalysts for manufacture of acrylonitrile or methacrylonitrile)

L37 ANSWER 21 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2001:194552 HCAPLUS  
DN 134:237954  
ED Entered STN: 22 Mar 2001  
TI Manufacture of oxidation catalyst for acrylic acid synthesis from propane  
IN Tu, Xin Lin; Takahashi, Mamoru; Azuma, Hiroshi  
PA Toa Gosei Chemical Industry Co., Ltd., Japan  
SO Jpn. Kokai Tokkyo Koho, 10 pp.  
CODEN: JKXXAF  
DT Patent  
LA Japanese  
IC ICM B01J023-28  
ICS B01J027-057; B01J037-02; C07C051-215; C07C057-05; C07B061-00  
CC 35-2 (Chemistry of Synthetic High Polymers)  
Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001070788	A2	20010321	JP 1999-250123	19990903 <--
PRAI	JP 1999-250123		19990903	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001070788	ICM	B01J023-28
	ICS	B01J027-057; B01J037-02; C07C051-215; C07C057-05; C07B061-00

AB The catalyst is manufactured by (a) reacting V+5 and Sb+3 at  $\geq 70^\circ$  in an aqueous medium containing Mo+6 and (b) mixing the resulting products with ammonium ion and oxalate ion in an aqueous solution containing Nb and/or Ta and calcining the resulting mixture, where in steps (a) and/or (b), Y-containing compds. (Y = Na, K, etc.) are mixed or Y-containing compds and Z-containing compds. (Z = Ag, Zr, etc.) are mixed and in step (b) 2-7 mol NH<sub>4</sub> ion and/or 4-12 mol oxalate ion (based on 1 mol Nb and/or Ta) are used to give MoVgSbhXiYjZkOm (X = Nb, Ta; Y = Na, K, etc.; Z = Ag, Zr; g, h = 0.01-1.5, h/g = 0.3-1; i = 0.001-3.0; j = 0.0001-0.1; k = 0-0.05; m = no of O to satisfy valency of the metals), which is further impregnated with A-containing compds. (A = K, Tl, Sb, etc.) and calcining. A mixed oxide 1/0.3/0.23/0.08/0.03 of Mo/V/Sb/Nb/K was prepared, impregnated with aqueous KHCO<sub>3</sub>, baked, and used to oxidize C<sub>3</sub>H<sub>8</sub> into acrylic acid with selectivity 62.25% and yield 34%.

ST oxidn catalyst acrylic acid synthesis propane; molybdenum vanadium antimony niobium potassium oxide catalyst

IT Oxidation catalysts

(manufacture of oxidation catalyst for acrylic acid synthesis from propane)

IT 207615-99-4P 330154-84-2P

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(manufacture of oxidation catalyst for acrylic acid synthesis from propane)

IT 79-10-7P, Acrylic acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(manufacture of oxidation catalyst for acrylic acid synthesis from propane)

IT 74-98-6, Propane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(manufacture of oxidation catalyst for acrylic acid synthesis from propane)

L37 ANSWER 22 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2000:427997 HCAPLUS  
 DN 133:43945  
 ED Entered STN: 27 Jun 2000  
 TI Ammoxidation catalysts and manufacture of (meth)acrylonitrile from propane or isobutane  
 IN Inoue, Tomoya; Hinako, Hidenori  
 PA Asahi Chemical Industry Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 8 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C07C255-08  
 ICS B01J023-28; B01J023-30; B01J023-32; B01J023-68; B01J023-88;  
 B01J027-057; B01J027-199; C07C253-24; C07B061-00  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000178242	A2	20000627	JP 1998-354398	19981214 <--
PRAI	JP 1998-354398		19981214	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2000178242	ICM	C07C255-08
	ICS	B01J023-28; B01J023-30; B01J023-32; B01J023-68; B01J023-88; B01J027-057; B01J027-199; C07C253-24; C07B061-00

AB (meth)acrylonitrile is manufactured by gas-phase ammoxidn. of propane or isobutane in the presence of  $\text{MoVpXqNbrZrsZtOn}$  ( $X = \text{Te}$  and/or  $\text{Sb}$ ;  $Z = \text{Ti}$ ,  $\text{W}$ ,  $\text{Cr}$ ,  $\text{Ta}$ ,  $\text{Sn}$ ,  $\text{Y}$ ,  $\text{Yb}$ ,  $\text{La}$ ,  $\text{Ce}$ ,  $\text{Bi}$ ,  $\text{Hf}$ ,  $\text{Mn}$ ,  $\text{Re}$ ,  $\text{Fe}$ ,  $\text{Ru}$ ,  $\text{Co}$ ,  $\text{Rh}$ ,  $\text{Ni}$ ,  $\text{Pd}$ ,  $\text{Pt}$ ,  $\text{Ag}$ ,  $\text{Zn}$ ,  $\text{B}$ ,  $\text{Al}$ ,  $\text{Ga}$ ,  $\text{In}$ ,  $\text{Ge}$ ,  $\text{Pb}$ ,  $\text{P}$ ,  $\text{Pr}$ ,  $\text{Nd}$ ,  $\text{Sm}$ ,  $\text{Gd}$ ,  $\text{Pm}$ ,  $\text{Eu}$ ,  $\text{Tb}$ ,  $\text{Dy}$ ,  $\text{Ho}$ ,  $\text{Er}$ ,  $\text{Tm}$ ,  $\text{Lu}$ , alkaline earth metal;  $0.1 \leq p \leq 0.6$ ;  $0.01 \leq q, r \leq 0.6$ ;  $0.001 \leq s \leq 0.3$ ;  $0 \leq t \leq 1$ ;  $n = \text{number}$  defined by the oxidation number of the constituting metals) supported on 20-60%  $\text{SiO}_2$ . The catalysts are easily prepared by spray drying solns. containing the catalyst components, then burning at 500-700° under O-free gas. A gaseous mixture of propane,  $\text{NH}_3$ , O, and He was passed through a fixed bed packed with  $\text{MoV}0.33\text{Nb}0.11\text{Te}0.22\text{Zr}0.05\text{On}$  supported on 30% silica at 415° and 1 atm with contact time 4.1 s-g/cc to give 53.5% acrylonitrile.

ST molybdenum vanadium niobium zirconium oxide ammoxidn; methacrylonitrile acrylonitrile manuf ammoxidn catalyst; propane isobutane ammoxidn catalyst support silica

IT Ammoxidation catalysts

(manufacture of (meth)acrylonitrile from propane or isobutane)

IT 1314-23-4, Zirconium oxide, reactions 7440-67-7D, Zirconium, tetrabasic acids, salts, reactions 13826-66-9, Zirconium oxide dinitrate 14475-63-9, Zirconium hydroxide

RL: RCT (Reactant); RACT (Reactant or reagent)

(catalyst prepared from; manufacture of (meth)acrylonitrile from propane or isobutane)

IT 7631-86-9, Silica, uses

RL: CAT (Catalyst use); USES (Uses)

(catalyst support; manufacture of (meth)acrylonitrile from propane or isobutane)

IT 275817-40-8P

RL: CAT (Catalyst use); IMP (Industrial manufacture); PREP (Preparation); USES (Uses)

(catalyst, supported on silica; manufacture of (meth)acrylonitrile from

- propane or isobutane)
- IT 107-13-1P, Acrylonitrile, preparation 126-98-7P, Methacrylonitrile  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of (meth)acrylonitrile from propane or isobutane)
- IT 74-98-6, Propane, reactions 75-28-5, Isobutane  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(manufacture of (meth)acrylonitrile from propane or isobutane)
- L37 ANSWER 23 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 1999:684479 HCAPLUS  
DN 131:342549  
ED Entered STN: 28 Oct 1999  
TI Combinatorial discovery of oxidative dehydrogenation catalysts within the  
Mo-V-Nb-O system  
AU Cong, Peijun; Dehestani, Ahmad; Doolen, Robert; Giaquinta, Daniel M.;  
Guan, Shenheng; Markov, Victor; Poojary, Damodara; Self, Kyle; Turner,  
Howard; Weinberg, W. Henry  
CS Symyx Technologies, Santa Clara, CA, 95051, USA  
SO Proceedings of the National Academy of Sciences of the United States of  
America (1999), 96(20), 11077-11080  
CODEN: PNASA6; ISSN: 0027-8424  
PB National Academy of Sciences  
DT Journal  
LA English  
CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
Section cross-reference(s): 23
- AB Combinatorial methodologies were used for the synthesis and screening of  
mixed metal oxide heterogeneous catalysts. Primary screening at low  
reactant conversions at a throughput of greater than 10,000 catalyst  
comps. per mo was performed by using simultaneous MS and photothermal  
deflection spectroscopy on spatially separated thick film catalysts with  
≈200 µg per catalyst prepared by using automated liquid dispensing.  
Secondary screening under realistic operating conditions was performed at  
a throughput of greater than 3,000 catalyst comps. per mo on ≈50  
mg of catalyst in an array of fixed bed microreactors with gas  
chromatograph detection. The approach was validated by the discovery of  
catalysts with superior performance to those previously described for the  
oxidative dehydrogenation of ethane to ethylene. We show the full  
implementation and integration of combinatorial methodologies for  
synthesis, screening, discovery, and optimization of multicomponent  
heterogeneous catalysts.
- ST combinatorial discovery oxidative dehydrogenation catalyst; molybdenum  
vanadium niobium oxide oxidative dehydrogenation catalyst combinatorial  
discovery; ethane oxidative dehydrogenation catalyst combinatorial  
discovery
- IT Combinatorial library  
(combinatorial discovery of oxidative dehydrogenation catalysts within  
Mo-V-Nb-O system)
- IT Dehydrogenation catalysts  
(oxidative; combinatorial discovery of oxidative dehydrogenation  
catalysts within Mo-V-Nb-O system)
- IT 51142-11-1P, Antimony lithium molybdenum vanadium oxide 145054-98-4P,  
Molybdenum niobium vanadium oxide 202708-41-6P, Antimony calcium  
molybdenum niobium vanadium oxide 250211-92-8P 250211-93-9P  
250211-94-0P  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP  
(Preparation); USES (Uses)  
(combinatorial discovery of oxidative dehydrogenation catalysts within  
Mo-V-Nb-O system)
- IT 74-84-0, Ethane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(combinatorial discovery of oxidative dehydrogenation catalysts within Mo-V-Nb-O system)

IT 74-85-1P, Ethene, preparation 250211-95-1P

RL: SPN (Synthetic preparation); PREP (Preparation)  
(combinatorial discovery of oxidative dehydrogenation catalysts within Mo-V-Nb-O system)

RE.CNT 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD  
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L37 ANSWER 24 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1999:311446 HCAPLUS

DN 130:338521

ED Entered STN: 21 May 1999

TI Ammoxidation catalysts and their use for manufacture of acrylonitrile from propane or methacrylonitrile from isobutane

IN Komada, Satoru; Hamada, Kazuyuki

PA Asahi Kasei Kogyo K. K., Japan

SO Ger. Offen., 20 pp.

CODEN: GWXXBX

DT Patent

LA German

IC ICM B01J027-057

ICS B01J023-28; C07C253-24; C07C255-08

ICI B01J027-057, B01J103-50; B01J027-057, B01J103-40; B01J027-057, B01J103-42; B01J027-057, B01J103-26

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 19847656	A1	19990506	DE 1998-19847656	19981015 <--
	JP 11244702	A2	19990914	JP 1998-286577	19981008 <--
	CN 1216721	A	19990519	CN 1998-124536	19981015 <--
	CN 1088398	B	20020731		
	US 6043186	A	20000328	US 1998-172648	19981015 <--
	HK 1018947	A1	20030314	HK 1999-104012	19990917 <--
PRAI	JP 1997-282304	A	19971015	<--	

## CLASS

	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
	DE 19847656	ICM	B01J027-057
		ICS	B01J023-28; C07C253-24; C07C255-08
		ICI	B01J027-057, B01J103-50; B01J027-057, B01J103-40; B01J027-057, B01J103-42; B01J027-057, B01J103-26
	DE 19847656	ECLA	B01J023/28; B01J027/057T; C07C253/24 <--
	US 6043186	NCL	502/312.000; 502/215.000; 502/305.000; 502/311.000; 502/321.000; 502/353.000; 558/323.000
		ECLA	B01J023/28; B01J027/057T; C07C253/24 <--
AB	The catalysts, which may be supported on SiO <sub>2</sub> , are mixed oxides represented as MoVaNbXcZdEeOn, where X is Sb or Te, Z is Yb, Dy, or Er, E is Nd, Sm, La, Pr, Eu, Gd, Tb, Ho, Tm, Lu, or Sc, a = 0.1-1.0, b and c = 0.01-1.0, d and e = 0-0.1, d + e = 0.001-0.1, and n has the value required by stoichiometry. Thus, a mixed oxide MoV <sub>0.34</sub> Nb <sub>0.14</sub> Te <sub>0.24</sub> Yb <sub>0.01</sub> On was prepared from (NH <sub>4</sub> ) <sub>6</sub> Mo <sub>7</sub> O <sub>24</sub> , NH <sub>4</sub> VO <sub>3</sub> , H <sub>6</sub> TeO <sub>6</sub> , Nb <sub>2</sub> O <sub>5</sub> hydrate, oxalic acid, and Yb(OAc) <sub>3</sub> , spray-dried, oxidized for 2 h at 275° in air, and calcined for 2 h at 600° under N. Contacting 1.0:1.2:2.8:12.0 (molar) C <sub>3</sub> H <sub>8</sub> -NH <sub>3</sub> -O <sub>2</sub> -He with the catalyst at 440° and atmospheric pressure produced acrylonitrile in 57.1% yield (based on propane), compared with 55.3% when the Yb was omitted from the catalyst.		
ST	acrylonitrile manuf ammoxidn catalyst; mixed oxide ammoxidn catalyst; methacrylonitrile manuf ammoxidn catalyst; molybdenum tellurium vanadium rare earth oxide		
IT	Ammoxidation catalysts (ammoxidn. catalysts for manufacture of (meth)acrylonitrile)		
IT	224324-27-0P	224324-30-5P	224324-34-9P 224324-37-2P 224324-44-1P 224324-48-5P 224324-51-0P 224324-54-3P 224324-57-6P 224324-60-1P 224324-63-4P 224324-67-8P 224324-70-3P 224324-73-6P RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses) (ammoxidn. catalysts for manufacture of (meth)acrylonitrile)
IT	107-13-1P, Acrylonitrile, preparation	126-98-7P, Methacrylonitrile	RL: IMF (Industrial manufacture); PREP (Preparation) (ammoxidn. catalysts for manufacture of (meth)acrylonitrile)
IT	74-98-6, Propane, reactions	75-28-5, Isobutane	RL: RCT (Reactant); RACT (Reactant or reagent) (ammoxidn. catalysts for manufacture of (meth)acrylonitrile)
IT	7631-86-9, Silica, uses		RL: CAT (Catalyst use); USES (Uses) (catalyst support; ammoxidn. catalysts for manufacture of (meth)acrylonitrile)

L37 ANSWER 25 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1998:423968 HCAPLUS  
 DN 129:149337  
 ED Entered STN: 10 Jul 1998  
 TI Manufacture of ethylene by oxidative dehydrogenation of ethane  
 IN Koyasu, Sachio; Wajiki, Noboru

PA Mitsubishi Chemical Industries Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 13 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C07C011-04  
 ICS B01J023-22; C07C005-48; C07B061-00  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23, 45, 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10175885	A2	19980630	JP 1997-101450	19970418 <--
PRAI	JP 1996-105104	A	19960425	<--	
	JP 1996-272190	A	19961015	<--	

CLASS

	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
	JP 10175885	ICM	C07C011-04
		ICS	B01J023-22; C07C005-48; C07B061-00
AB	Ethylene is manufactured from ethane in the presence of complexed metal oxide catalysts and mol. oxygen. The complexed metal oxides contain molybdenum, vanadium, and antimony as essential components and have certain X-ray diffraction pattern.		
ST	ethylene manuf ethane dehydrogenation; catalyst metal oxide ethylene manuf		
IT	Oxides (inorganic), preparation		
	RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation);		
	USES (Uses)		
	(complexed metal oxide catalysts for manufacture of ethylene by oxidative dehydrogenation of ethane)		
IT	Dehydrogenation catalysts		
	(oxidative; complexed metal oxide catalysts for manufacture of ethylene by oxidative dehydrogenation of ethane)		
IT	55521-81-8P, Antimony molybdenum vanadium oxide 61115-21-7P, Antimony iron molybdenum vanadium oxide 170621-18-8P 193405-60-6P		
	198018-04-1P 202523-10-2P 204920-27-4P		
	210831-51-9P 210831-55-3P 210831-57-5P 210831-59-7P		
	210831-61-1P 210831-65-5P 210831-68-8P 210831-71-3P 210831-73-5P,		
	Antimony molybdenum vanadium zinc oxide 210831-75-7P 210831-78-0P		
	210831-80-4P, Antimony molybdenum tin vanadium oxide 210831-82-6P,		
	Antimony lead molybdenum vanadium oxide 210831-85-9P		
	210831-87-1P		
	RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP		
	(Preparation); USES (Uses)		
	(complexed metal oxide catalysts for manufacture of ethylene by oxidative dehydrogenation of ethane)		
IT	74-85-1P, Ethene, preparation		
	RL: IMF (Industrial manufacture); PREP (Preparation)		
	(manufacture of ethylene by oxidative dehydrogenation of ethane)		
IT	74-84-0, Ethane, reactions		
	RL: RCT (Reactant); RACT (Reactant or reagent)		
	(manufacture of ethylene by oxidative dehydrogenation of ethane)		
IT	144-62-7, Ethanedioic acid, reactions 1309-64-4, Antimony trioxide,		
	reactions 7631-86-9, Silica, reactions 7803-55-6, Ammonium		
	metavanadate 10026-22-9, Cobalt nitrate hexahydrate 10031-43-3,		
	Copper(II) nitrate trihydrate 10099-74-8, Lead nitrate 10196-18-6,		
	Zinc nitrate hexahydrate 10377-66-9, Manganese nitrate 12028-48-7,		
	Ammonium metatungstate 12054-85-2 12627-00-8, Niobium oxide		
	13268-42-3 13465-14-0 13478-00-7, Nickel nitrate hexahydrate		
	13548-38-4, Chromium nitrate 14475-63-9, Zirconium hydroxide		

18282-10-5, Tin dioxide 21348-60-7, Tantalum oxalate 25749-23-9,  
 Aluminum nitrate hexahydrate 37382-23-3, Cerium hydroxide 94844-97-0,  
 Ammonium titanium oxalate 168547-43-1

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of complexed metal oxide catalysts for manufacture of ethylene

by

oxidative dehydrogenation of ethane)

L37 ANSWER 26 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1998:307084 HCAPLUS

DN 129:17245

ED Entered STN: 25 May 1998

TI Catalysts for gas-phase oxidation of isobutane and their manufacture

IN Okusako, Akinori; Ui, Toshiaki; Nagai, Koichi

PA Sumitomo Chemical Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM B01J023-28

ICS B01J023-30; B01J023-31; B01J023-68; B01J023-88; B01J027-057;  
 C07B061-00; C07C011-09; C07C027-12; C07C047-22; C07C057-05

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

Section cross-reference(s): 23, 35, 67

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 10128112	A2	19980519	JP 1996-290087	19961031 <--
PRAI JP 1996-290087		19961031 <--		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 10128112	ICM	B01J023-28
	ICS	B01J023-30; B01J023-31; B01J023-68; B01J023-88; B01J027-057; C07B061-00; C07C011-09; C07C027-12; C07C047-22; C07C057-05

AB The catalysts comprise MoaVbXcYdZeOf (X = Sb, Te; Y = As, B, Ge; Z = K, Cs, Rb, Ca, Mg, Tl, Cr, Mn, F, Co, Ni, Cu, Ag, Bi, Al, Ga, In, Sn, Zn, La, Ce, Y, W, Nb, Ta; if a = 12, then 0 < b ≤ 6, 0 < c ≤ 20, 0 ≤ d ≤ 6, 0 ≤ e ≤ 6). The catalysts are manufactured by calcination of precursors under inert gases. Thus, a mixture

of

Nb(HC2O4)5, vanadyl oxalate, (NH4)6Mo7O24, and Sb2O3 was calcined at 600° for 2 h to give Mo12V3Sb9Nb1.5Ox. Isobutane/O/N/H2O were passed through the catalyst at 425°, 152 kPa, and 1000/h to result in isobutane conversion 6.3% and selectivity for isobutylene, methacrolein, and methacrylic acid 11.9, 23.8, and 7.8%, resp.

ST isobutane oxidn catalyst metal oxide; isobutylene manuf isobutane oxidn catalyst; methacrolein manuf isobutane oxidn catalyst; methacrylic acid manuf isobutane oxidn catalyst

IT Oxidation catalysts

(gas-phase; mixed metal oxide catalysts for gas-phase oxidation of isobutane)

IT Oxides (inorganic), preparation

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(mixed metal oxide catalysts for gas-phase oxidation of isobutane)

IT 55521-81-8P, Antimony molybdenum vanadium oxide 146569-48-4P, Molybdenum niobium tellurium vanadium oxide 193405-60-6P, Antimony molybdenum niobium vanadium oxide 198018-00-7P, Antimony germanium molybdenum



niobium vanadium oxide 198018-02-9P, Antimony molybdenum niobium tin  
vanadium oxide 198018-04-1P, Antimony iron molybdenum niobium  
vanadium oxide

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)

(mixed metal oxide catalysts for gas-phase oxidation of isobutane)

IT 78-85-3P, Methacrolein 79-41-4P, Methacrylic acid, preparation

115-11-7P, Isobutylene, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(mixed metal oxide catalysts for gas-phase oxidation of isobutane)

IT 75-28-5, Isobutane

RL: RCT (Reactant); RACT (Reactant or reagent)

(mixed metal oxide catalysts for gas-phase oxidation of isobutane)

L37 ANSWER 27 OF 27 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1998:289594 HCAPLUS

DN 129:15908

ED Entered STN: 18 May 1998

TI Preparation of acrylic acid from propane using mixed metal oxide catalysts

IN Takahashi, Mamoru; To, Shinrin; Hirose, Toshiro

PA Toa Gosei Chemical Industry Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C057-05

ICS B01J023-28; C07C051-215; C07B061-00

CC 23-16 (Aliphatic Compounds)

Section cross-reference(s): 35, 67

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10120617	A2	19980512	JP 1996-297755	19961021 <--
	FR 2754817	A1	19980424	FR 1997-13152	19971021 <--
	FR 2754817	B1	20000317		
	US 5994580	A	19991130	US 1997-955246	19971021 <--
	US 6060422	A	20000509	US 1999-339230	19990624 <--
PRAI	JP 1996-297755	A	19961021	<--	
	JP 1997-54200	A	19970221	<--	
	US 1997-955246	A3	19971021	<--	

CLASS

	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
	JP 10120617	ICM	C07C057-05
		ICS	B01J023-28; C07C051-215; C07B061-00
	FR 2754817	ECLA	B01J023/28; C07C051/215+57/04 <--
	US 5994580	NCL	562/549.000; 502/311.000; 502/312.000
		ECLA	B01J023/28; C07C051/215+57/04 <--
	US 6060422	NCL	502/312.000; 423/594.100; 423/595.000; 423/598.000; 423/604.000; 423/606.000; 423/607.000; 423/608.000; 423/610.000; 423/617.000; 423/618.000; 423/632.000; 502/311.000; 502/314.000; 502/315.000; 502/316.000; 502/321.000
		ECLA	B01J023/28 <--
AB	Acrylic acid (I) is prepared by gas-phase oxidation of propane using mixed metal oxide catalysts prepared by supporting compds. of Na, K, Rb, Cs, P, and/or As on metal oxides having atomic ratio of MoViSbjAk (A = Nb, Ta, Sn, W, Ti, Ni, Fe, Cr, Co; i, j, k = 0.001-3.0), followed by calcination. A gaseous mixture comprising propane 4.4, O 7.0, N 26.3, and steam 62.3 volume% was charged at SV 1600/h into a reactor containing mixed metal oxide		

(Mo/Sb/V/Nb/K = 1.0/0.25/0.3/0.12/0.013 by atomic ratio) at 400° to give I with selectivity 69.7% and conversion 27.1%.

ST acrylic acid prepn; propane oxidn catalyst molybdenum vanadium oxide; antimony niobium potassium oxide catalyst oxidn; gas phase oxidn propane catalyst prepn

IT Oxidation catalysts  
(gas-phase; preparation of acrylic acid from propane using mixed metal oxide catalysts)

IT 7439-89-6D, Iron, mixed metal oxides, uses 7440-02-0D, Nickel, mixed metal oxides, uses 7440-23-5D, Sodium, mixed metal oxides, uses 7440-25-7D, Tantalum, mixed metal oxides, uses 7440-31-5D, Tin, mixed metal oxides, uses 7440-32-6D, Titanium, mixed metal oxides, uses 7440-33-7D, Tungsten, mixed metal oxides, uses 7440-38-2D, Arsenic, mixed metal oxides, uses 7440-46-2D, Cesium, mixed metal oxides, uses 7440-47-3D, Chromium, mixed metal oxides, uses 7440-48-4D, Cobalt, mixed metal oxides, uses  
RL: CAT (Catalyst use); USES (Uses)  
(preparation of acrylic acid from propane using mixed metal oxide catalysts)

IT 207615-99-4P 207616-00-0P 207616-02-2P  
207616-04-4P  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(preparation of acrylic acid from propane using mixed metal oxide catalysts)

IT 79-10-7P, Acrylic acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(preparation of acrylic acid from propane using mixed metal oxide catalysts)

IT 74-98-6, Propane, reactions 298-14-6, Potassium bicarbonate 7783-28-0, Diammonium phosphate 13126-12-0, Rubidium nitrate 193405-60-6, Antimony molybdenum niobium vanadium oxide  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(preparation of acrylic acid from propane using mixed metal oxide catalysts)

=> => d 138 all tot

L38 ANSWER 1 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2004:117419 HCAPLUS  
DN 140:170371  
ED Entered STN: 13 Feb 2004  
TI Production method of oxidation reaction catalyst  
IN Hinako, Hidenori  
PA Asahi Kasei Chemical Corporation, Japan  
SO Jpn. Kokai Tokkyo Koho, 12 pp.  
CODEN: JKXXAF  
DT Patent  
LA Japanese  
IC ICM B01J023-28  
ICS B01J037-03; C07C051-215; C07C057-05; C07C253-24; C07C255-08;  
C07B061-00  
CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
Section cross-reference(s): 23

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004041839	A2	20040212	JP 2002-199628	20020709 <--
PRAI	JP 2002-199628		20020709	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2004041839	ICM	B01J023-28

ICS B01J037-03; C07C051-215; C07C057-05; C07C253-24;  
C07C255-08; C07B061-00

JP 2004041839 FTERM 4G069/AA02; 4G069/AA03; 4G069/AA08; 4G069/BA02A;  
4G069/BA02B; 4G069/BB06A; 4G069/BB06B; 4G069/BB06C;  
4G069/BC08A; 4G069/BC16A; 4G069/BC16B; 4G069/BC17A;  
4G069/BC18A; 4G069/BC21A; 4G069/BC22A; 4G069/BC23A;  
4G069/BC25A; 4G069/BC25B; 4G069/BC25C; 4G069/BC26A;  
4G069/BC26B; 4G069/BC35A; 4G069/BC38A; 4G069/BC40A;  
4G069/BC50A; 4G069/BC51A; 4G069/BC52A; 4G069/BC54A;  
4G069/BC54B; 4G069/BC54C; 4G069/BC55A; 4G069/BC55B;  
4G069/BC55C; 4G069/BC56A; 4G069/BC58A; 4G069/BC58C;  
4G069/BC59A; 4G069/BC59B; 4G069/BC59C; 4G069/BC60A;  
4G069/BC60C; 4G069/BC62A; 4G069/BC64A; 4G069/BC66C;  
4G069/BC67A; 4G069/BC67C; 4G069/BC68A; 4G069/BC68C;  
4G069/BC70A; 4G069/BC71A; 4G069/BC72A; 4G069/BC75A;  
4G069/BD03A; 4G069/BD07A; 4G069/BD10A; 4G069/CB07;  
4G069/CB17; 4G069/CB53; 4G069/CB54; 4G069/CB74;  
4G069/FA01; 4G069/FA02; 4G069/FB06; 4G069/FB09;  
4G069/FB30; 4G069/FC02; 4G069/FC07; 4G069/FC08;  
4H006/AA02; 4H006/AC46; 4H006/AC54; 4H006/BA07;  
4H006/BA09; 4H006/BA10; 4H006/BA12; 4H006/BA13;  
4H006/BA14; 4H006/BA15; 4H006/BA18; 4H006/BA22;  
4H006/BA30; 4H006/BA35; 4H006/BA81; 4H006/BB61;  
4H006/BC10; 4H006/BC11; 4H006/BC18; 4H006/BC31;  
4H006/BC32; 4H006/BE14; 4H006/BE30; 4H006/BS10;  
4H006/QN24; 4H039/CA65; 4H039/CA70; 4H039/CC30;  
4H039/CL50 <--

AB The invention relates to a production method of an oxidation reaction catalyst represented by  $\text{MolVaYbNbCbZdZeOn}$  [Y = Sb and/or Te; Z = Ti, W, Cr, Al, Ta, Zr, Hf, Mn, Re, Fe, Ru, Rh, Ni, Co, Pd, Pt, Zn, B, Ga, In, Ge, Sn, P, Pb, Y, rare earth elements, and alkali earth elements;  $0.1 \leq a \leq 1.0$ ,  $0.01 \leq b \leq 0.60$ ,  $0.01 \leq c \leq 0.30$ ,  $0.01 \leq d \leq 0.5$ ,  $0 \leq e \leq 1$ , and n = atomic ratio determined by oxidation states of constituent metals].

The catalyst is used to produce unsatd. nitriles and carbonic acids from propane and isobutane by ammoxidn. and oxidation reactions in gas phase contact reactions. Thus the catalyst production involves the preparation of the solution containing Mo, V, Nb, Z, Sb and/or Te precursors, and the composite oxide represented by  $\text{Bi1XqOm}$  [X = Mo, V, W, Nb, Fe, Ni, Cr and Co;  $0.1 \leq q \leq 30$ , and m = atomic ratio determined by oxidation states of constituent metals].

ST oxidn catalyst aluminum antimony bismuth molybdenum niobium vanadium oxide; ammoxidn catalyst aluminum antimony bismuth molybdenum niobium vanadium oxide

IT Ammoxidation catalysts  
Oxidation catalysts  
(ammoxidn. and oxidation reaction catalysts)

IT 260557-95-7 656829-20-8  
RL: CAT (Catalyst use); USES (Uses)  
(ammoxidn. and oxidation reaction catalysts)

IT 13595-85-2P, Bismuth molybdenum oxide ( $\text{Bi}_2\text{Mo}_3\text{O}_{12}$ )  
RL: PNU (Preparation, unclassified); PREP (Preparation)  
(ammoxidn. and oxidation reaction catalysts)

IT 74-98-6, Propane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(ammoxidn. and oxidation reaction catalysts)

L38 ANSWER 2 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2003:504752 HCAPLUS  
 DN 139:74539  
 ED Entered STN: 02 Jul 2003  
 TI Production method of oxidation or ammoxidation catalyst  
 IN Kato, Takaaki; Komata, Satoru  
 PA Asahi Kasei Corporation, Japan  
 SO Jpn. Kokai Tokkyo Koho, 7 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM B01J023-28  
 ICS B01J037-00; B01J037-04; C07B061-00; C07C051-215; C07C051-25;  
 C07C253-24; C07C253-26  
 CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003181287	A2	20030702	JP 2001-379626	20011213 <--
PRAI	JP 2001-379626		20011213	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2003181287	ICM	B01J023-28
	ICS	B01J037-00; B01J037-04; C07B061-00; C07C051-215; C07C051-25; C07C253-24; C07C253-26

AB The invention refers to a production method of an oxidation or ammoxidn. catalyst, suitable for use in the production of saturated or unsatd. nitriles, comprising a raw material mixing process, a drying process and a calcining process, wherein the raw materials stay in the pipes during the mixing and drying process for 3 s to 1 h to control the gelation process. The oxide catalyst may be given as MoVaNb(Sb,Te)O<sub>n</sub> [ $0.01 \leq a \leq 1$ ;  $0.01 \leq b \leq 1$ ;  $0.01 \leq c \leq 1$ ;  $n =$  determined by valence of metals].

ST ammoxidn oxidn catalyst molybdenum vanadium niobium tellurium antimony oxide; nitrile manuf molybdenum vanadium niobium tellurium antimony oxide catalyst

IT Ammoxidation catalysts  
 Oxidation catalysts  
 (production method of oxidation or ammoxidn. catalyst)

IT Nitriles, preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (production method of oxidation or ammoxidn. catalyst)

IT 146569-48-4, Molybdenum niobium tellurium vanadium oxide  
 149920-38-7, Antimony molybdenum niobium tellurium vanadium oxide  
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
 (production method of oxidation or ammoxidn. catalyst)

IT 193405-60-6P, Antimony molybdenum niobium vanadium oxide  
 RL: CAT (Catalyst use); DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (production method of oxidation or ammoxidn. catalyst)

IT 74-98-6, Propane, reactions 1309-64-4, Antimony oxide, reactions 1313-96-8, Niobium oxide 7803-55-6, Ammonium metavanadate 12027-67-7, Ammonium heptamolybdate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (production method of oxidation or ammoxidn. catalyst)

L38 ANSWER 3 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2003:470372 HCAPLUS  
 DN 139:36960  
 ED Entered STN: 20 Jun 2003

TI Methods and systems for high throughput analysis  
 IN Linsen, Michael William; Schmitt, Edward Albert; Schure, Mark Richard  
 PA Rohm and Haas Company, USA  
 SO Eur. Pat. Appl., 23 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM G01N033-50  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 67

## FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1319951	A2	20030618	EP 2002-258484	20021209 <--
	EP 1319951	A3	20040204		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK				
	US 6901334	B2	20050531	US 2002-307654	20021202 <--
	ZA 2002009803	A	20030611	ZA 2002-9803	20021203 <--
	CN 1427261	A	20030702	CN 2002-155921	20021211 <--
	JP 2003227819	A2	20030815	JP 2002-359721	20021211 <--
	BR 2002005254	A	20040720	BR 2002-5254	20021213 <--
	SG 104991	A1	20040730	SG 2002-7626	20021217 <--
	US 2005019940	A1	20050127	US 2004-910974	20040804 <--
PRAI	US 2001-339903P	P	20011217	<--	
	US 2002-307654	A3	20021202		

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1319951	ICM	G01N033-50
EP 1319951	ECLA	B01J019/00C; G01N031/10 <--
US 6901334	NCL	702/022.000; 702/022.000; 702/030.000; 702/182.000; 702/189.000; 422/211.000; 422/131.000; 423/213.200; 423/230.000; 502/103.000
	ECLA	B01J019/00C; G01N031/10 <--
US 2005019940	NCL	436/139.000; 422/068.100
	ECLA	B01J019/00C; G01N031/10 <--

AB Methods of analyzing processes for making catalysts and/or certain properties of catalysts using a plurality of reaction zones are provided. The methods have the capability to define and execute, in rapid succession, a plurality of expts. under disparate reaction conditions. An operator may define and execute a plurality of expts. on user-defined quantities of disparate catalysts, using user-defined input feeds, residence times, and temperature profiles. Anal. of multi-metal oxide catalysts

for converting propane to acrylic acid was exemplified.

ST propane conversion metal oxide catalyst acrylic acid; metal oxide catalyst throughput analysis

IT Oxidation

Oxidation catalysts

(high throughput anal. of catalysts for conversion of propane to acrylic acid)

IT Oxides (inorganic), uses

RL: CAT (Catalyst use); USES (Uses)

(high throughput anal. of catalysts for conversion of propane to acrylic acid)

IT Alkanes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(high throughput anal. of catalysts for oxidation of alkanes)

IT 146569-48-4 193405-60-6 261919-86-2 406675-87-4

RL: CAT (Catalyst use); USES (Uses)  
 (high throughput anal. of catalysts for conversion of propane to acrylic acid)

IT 79-10-7P, Acrylic acid, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (high throughput anal. of catalysts for conversion of propane to acrylic acid)

IT 74-98-6, Propane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (high throughput anal. of catalysts for conversion of propane to acrylic acid)

L38 ANSWER 4 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2003:319785 HCAPLUS  
 DN 138:323030  
 ED Entered STN: 25 Apr 2003  
 TI Ethane oxidation catalyst and process utilizing the catalyst  
 IN Ellis, Brian  
 PA BP Chemicals Limited, UK  
 SO PCT Int. Appl., 15 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 IC ICM B01J023-68  
 ICS B01J023-52; C07C051-25; C07C051-215  
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	WO 2003033138	A1	20030424	WO 2002-GB4018	20020904 <--	
	W:			AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW		
	RW:			GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG		
	CA 2460030	AA	20030424	CA 2002-2460030	20020904 <--	
	EP 1439907	A1	20040728	EP 2002-755310	20020904 <--	
	R:			AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK		
	BR 2002012529	A	20041019	BR 2002-12529	20020904 <--	
	JP 2005505414	T2	20050224	JP 2003-535926	20020904 <--	
	US 2004249204	A1	20041209	US 2004-491287	20040331 <--	
PRAI	GB 2001-24835	A	20011016	<--		
	GB 2002-18870	A	20020813	<--		
	WO 2002-GB4018	W	20020904	<--		

# CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003033138	ICM	B01J023-68
	ICS	B01J023-52; C07C051-25; C07C051-215
WO 2003033138	ECLA	B01J023/00B; B01J023/68M6; B01J023/68M4; B01J023/68R; B01J023/89G18; C07C051/215+53/08; C07C051/25+53/08; B01J023/68
JP 2005505414	FTERM	4G069/AA02; 4G069/BB06A; 4G069/BB06B; 4G069/BC16A;

4G069/BC17A; 4G069/BC17B; 4G069/BC18A; 4G069/BC21A;  
4G069/BC22A; 4G069/BC22B; 4G069/BC23A; 4G069/BC25A;  
4G069/BC25B; 4G069/BC26A; 4G069/BC26B; 4G069/BC31A;  
4G069/BC31B; 4G069/BC32A; 4G069/BC32B; 4G069/BC33A;  
4G069/BC33B; 4G069/BC54A; 4G069/BC54B; 4G069/BC55A;  
4G069/BC55B; 4G069/BC59A; 4G069/BC59B; 4G069/BC60A;  
4G069/BC64A; 4G069/BC64B; 4G069/BC66A; 4G069/BC66B;  
4G069/BC75A; 4G069/BC75B; 4G069/BD03A; 4G069/CB07;  
4G069/DA06; 4G069/EA01Y; 4G069/FA01; 4G069/FB04;  
4G069/FB30; 4G069/FB31; 4G069/FC08; 4H006/AA02;  
4H006/AC46; 4H006/BA05; 4H006/BA09; 4H006/BA11;  
4H006/BA12; 4H006/BA13; 4H006/BA14; 4H006/BA16;  
4H006/BA19; 4H006/BA26; 4H006/BA30; 4H006/BA81;  
4H006/BA82; 4H006/BC10; 4H006/BC11; 4H006/BC32;  
4H006/BS10; 4H039/CA65; 4H039/CC30 <--  
US 2004249204 NCL 562/549.000  
ECLA B01J023/00B; B01J023/68; B01J023/68M4; B01J023/68M6;  
B01J023/68R; B01J023/89G18; C07C051/215+53/08;  
C07C051/25+53/08 <--  
OS CASREACT 138:323030  
AB A catalyst composition for the selective oxidation of ethane to HOAc and/or for  
the selective oxidation of ethylene to HOAc, comprises in combination with O  
the elements Mo, V, Nb, Au in the absence of Pd, MoaWbAucVdNbeZf where Z  
≥1 elements selected from B, Al, Ga, In, Ge, Sn, Pb, Sb, Cu, Pt,  
Ag, Fe and Re; a, b, c, d, e and f = the gram atom ratios of the elements  
such that:  $0 < a \leq 1$ ;  $0 \leq b < 1$  and  $a + b = 1$ ;  $10^{-5} \leq c$   
 $\leq 0.02$ ;  $0 < d \leq 2$ ;  $0 < e \leq 1$ ; and  $0.0001 \leq f$   
 $\leq 0.05$ . The catalyst Mo1.0V0.423Nb0.115Au0.008Re0.0080 was applied  
to ethane conversion showing acetic acid selectivity 70.1% at space time  
yield 131.1 g/kg cat/h.  
ST ethane oxidn catalyst acetic acid; ethylene oxidn catalyst acetic acid  
IT Oxidation catalysts  
(ethane oxidation catalyst for acetic acid manufacture)  
IT 511313-28-3 511313-29-4 511313-30-7 511313-31-8  
511313-32-9 511313-33-0 511313-34-1 511313-35-2  
RL: CAT (Catalyst use); USES (Uses)  
(ethane oxidation catalyst for acetic acid manufacture)  
IT 64-19-7P, Acetic acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(ethane oxidation catalyst for acetic acid manufacture)  
IT 74-84-0, Ethane, reactions 74-85-1, Ethylene, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(ethane oxidation catalyst for acetic acid manufacture)  
RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE  
(1) Bp Chem Int Ltd; EP 1043064 A 2000 HCAPLUS  
(2) David, J; WO 9951339 A 1999 HCAPLUS  
(3) Roesky, R; US 6274765 B1 2001 HCAPLUS  
(4) Rohm & Haas; EP 1192987 A 2002 HCAPLUS  
L38 ANSWER 5 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2002:345937 HCAPLUS  
DN 136:355590  
ED Entered STN: 09 May 2002  
TI Promoted multi-metal oxide catalyst for alkane oxidation  
IN Bogan, Leonard Edward, Jr.  
PA Rohm and Haas Company, USA  
SO U.S., 9 pp.  
CODEN: USXXAM  
DT Patent

LA English  
 IC ICM B01J023-22  
 ICS B01J023-24; C07F009-94; C07F013-00  
 INCL 502311000  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6383978	B1	20020507	US 2001-928022	20010809 <--
	EP 1256381	A2	20021113	EP 2001-308712	20011012 <--
	EP 1256381	A3	20030402		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	BR 2001004630	A	20021217	BR 2001-4630	20011022 <--
	JP 2002320853	A2	20021105	JP 2001-334280	20011031 <--
	CN 1381309	A	20021127	CN 2001-137713	20011031 <--
	US 6472552	B1	20021029	US 2002-96018	20020312 <--
PRAI	US 2001-286218P	P	20010425	<--	
	US 2001-286222P	P	20010425	<--	
	US 2001-928022	A	20010809	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 6383978	ICM	B01J023-22
	ICS	B01J023-24; C07F009-94; C07F013-00
	INCL	502311000
US 6383978	NCL	502/311.000; 502/309.000; 502/310.000; 502/312.000; 502/322.000; 556/042.000; 556/047.000
	ECLA	B01J023/00B; B01J023/22; B01J023/28; B01J027/057T; C07C051/215+57/04; C07C253/24 <--
EP 1256381	ECLA	B01J023/00B; B01J023/22; B01J023/28; B01J027/057T; C07C051/215+57/04; C07C253/24 <--
US 6472552	NCL	558/319.000; 502/511.000; 562/549.000
	ECLA	B01J023/00B; B01J023/22; B01J023/28; B01J027/057T; C07C051/215+57/04; C07C253/24 <--

AB A promoted multi-metal oxide catalyst is useful for the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, to an unsatd. carboxylic acid and for the vapor phase ammoxidn. of an alkane, or a mixture of an alkane and an alkene, to an unsatd. nitrile. Ammonium heptamolybdate (51.35 g), ammonium metavanadate (10.11 g) and telluric acid (15.36 g) were dissolved in warm water, oxalic acid dihydrate (5.68 g) was dissolved in a 6.5% solution of niobium oxalate in water (249.55 g), and the resulting niobium oxalate solution was added to the first solution, after stirring 15 min, the mixture was dried in a rotary evaporator, overnight under vacuum, and calcined 1 h at 275° in air and 2 h at 600° in Ar.

ST metal oxide promoted oxidn catalyst alkane; ammoxidn catalyst alkane metal oxide; molybdenum vanadium mixed metal oxide

IT Oxidation catalysts  
 (promoted mixed metal oxide catalyst for alkane oxidation to unsatd. carboxylic acid)

IT Ammoxidation catalysts  
 (promoted mixed metal oxide catalyst for alkane oxidation to unsatd. nitrile)

IT 74-98-6, Propane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidation; promoted mixed metal oxide catalyst for alkane oxidation to unsatd. nitrile)

IT 149920-40-1, Bismuth molybdenum niobium tellurium vanadium oxide



420134-66-3

RL: CAT (Catalyst use); USES (Uses)

(promoted mixed metal oxide catalyst for alkane oxidation to unsatd. nitrile)

IT 79-10-7P, Acrylic Acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(promoted mixed metal oxide catalyst for alkane oxidation to unsatd. nitrile)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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- (2) Anon; JP 753448 1995
- (3) Cirjak; US 6043185 A 2000 HCAPLUS
- (4) Hatano; US 5049692 A 1991 HCAPLUS
- (5) Martin; US 5569636 A 1996 HCAPLUS
- (6) Martin; US 5583084 A 1996 HCAPLUS
- (7) Ushikubo; US 5231214 A 1993 HCAPLUS
- (8) Ushikubo; US 5281745 A 1994 HCAPLUS
- (9) Ushikubo; US 5380933 A 1995 HCAPLUS

L38 ANSWER 6 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2002:77444 HCAPLUS

DN 136:118213

ED Entered STN: 29 Jan 2002

TI Preparation of unsaturated carboxylic acids

IN Koyasu, Yukio; Yoshikawa, Yumiko

PA Mitsubishi Chemical Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C051-25

ICS B01J023-28; C07C057-05; C07B061-00

CC 23-16 (Aliphatic Compounds)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002030028	A2	20020129	JP 2000-212126	20000713 <--
PRAI	JP 2000-212126		20000713	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2002030028	ICM	C07C051-25
	ICS	B01J023-28; C07C057-05; C07B061-00

OS CASREACT 136:118213

AB Title compds. are prepared by gas-phase oxidation of olefins in the presence of mixed oxide catalysts containing Mo, V, and Sb. A mixture of propylene, O, and H<sub>2</sub>O was fed into a reactor containing Mo<sub>1</sub>V<sub>0.23</sub>Nb<sub>0.1</sub>Sb<sub>0.13</sub>O<sub>n</sub> (prepared from ammonium paramolybdate, Sb<sub>2</sub>O<sub>3</sub>, ammonium metavanadate, Nb<sub>2</sub>O<sub>5</sub>) at 400° and SV 3600 h<sup>-1</sup> to give 67.8% acrylic acid.

ST unsatd carboxylic acid prepn; acrylic acid prepn; olefin oxidn molybdenum vanadium antimony oxide catalyst

IT Oxidation catalysts

(preparation of unsatd. carboxylic acids)

IT Alkenes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of unsatd. carboxylic acids)

IT Carboxylic acids, preparation

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(unsatd.; preparation of unsatd. carboxylic acids)  
 IT 193405-60-6, Antimony molybdenum niobium vanadium oxide 202523-10-2,  
 Antimony molybdenum titanium vanadium oxide 204920-27-4,  
 Antimony cerium molybdenum niobium vanadium oxide 390750-04-6  
 RL: CAT (Catalyst use); USES (Uses)

(preparation of unsatd. carboxylic acids)  
 IT 79-10-7P, Acrylic acid, preparation  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP  
 (Preparation)

(preparation of unsatd. carboxylic acids)  
 IT 115-07-1, Propylene, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of unsatd. carboxylic acids)

L38 ANSWER 7 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2001:733932 HCAPLUS

DN 135:278674

ED Entered STN: 09 Oct 2001

TI Catalyst for oxidation or ammoxidation

IN Komata, Satoru; Fukushima, Satoshi; Nagano, Osamu

PA Asahi Chemical Industry Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 11 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM B01J023-28

ICS B01J023-34; B01J023-88; B01J027-057; C07C051-215; C07C057-05;

C07C253-24; C07C255-08; C07B061-00

CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001276618	A2	20011009	JP 2000-101415	20000403 <--
PRAI	JP 2000-101415		20000403	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001276618	ICM	B01J023-28
	ICS	B01J023-34; B01J023-88; B01J027-057; C07C051-215; C07C057-05; C07C253-24; C07C255-08; C07B061-00

AB The catalyst is used for the oxidation of propane and isobutane to for unsatd. acid nitrile. The catalyst can be represented by MoVaNbBcX<sub>d</sub>O<sub>n</sub> (X = Sb, Te; 0.1 ≤ a ≤ 1; 0.01 ≤ b ≤ 1; 0.1 ≤ c ≤ 3; 0.01 ≤ d ≤ 1; and n = integer). The catalyst showed high selectivity and wear resistance.

ST oxidn ammoxidn catalyst

IT Ammoxidation catalysts

Oxidation catalysts

(catalyst for oxidation or ammoxidn.)

IT 7631-86-9, Silica, uses 221394-85-0, Boron molybdenum niobium vanadium oxide 363610-76-8 363610-77-9 363610-78-0

RL: CAT (Catalyst use); USES (Uses)

(catalyst for oxidation or ammoxidn.)

IT 74-98-6, Propane, uses 75-28-5, Isobutane

RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(catalyst for oxidation or ammoxidn.)

L38 ANSWER 8 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2000:631571 HCAPLUS

DN 133:223163  
 ED Entered STN: 12 Sep 2000  
 TI Metal oxide catalysts, their preparation, and manufacture of acrylic acid with them  
 IN Takahashi, Mamoru; Tu, Xin Lin; Niizuma, Hiroshi  
 PA Toa Gosei Chemical Industry Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM B01J023-68  
 ICS B01J023-28; B01J023-88; B01J023-89; C07B061-00; C07C051-21; C07C057-055  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23, 67

## FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000246108	A2	20000912	JP 1999-52708	19990301 <--
PRAI	JP 1999-52708		19990301	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2000246108	ICM	B01J023-68
	ICS	B01J023-28; B01J023-88; B01J023-89; C07B061-00; C07C051-21; C07C057-055

AB The catalysts comprise Mo, V, Sb, A, (A is  $\geq 1$  elements selected from Nb and Ta), B (B is  $\geq 1$  elements selected from Ag, Zn, Sn, Pb, As, Cu, Tl, and Se). Ammonium metavanadate was reacted with SbO<sub>3</sub>, ammonium molybdate, and selenic acid in H<sub>2</sub>O under reflux for 16 h, mixed with niobic acid in the presence of H<sub>2</sub>O<sub>2</sub>, oxalic acid, and NH<sub>3</sub>, burned at 580° for 5 h to give a catalysts with Mo:V:Sb:Nb:Se ratios of 1.0:0.3:0.23:0.08:0.008. Oxidation of propane with O in the presence of the catalyst gave 32.1% acrylic acid.

ST metal oxide catalyst oxidn propane; acrylic acid prepn

IT Oxidation catalysts

(manufacture of metal oxide catalysts and acrylic acid with them)

IT 292139-84-5 292139-85-6 292139-86-7

RL: CAT (Catalyst use); USES (Uses)

(manufacture of metal oxide catalysts and acrylic acid with them)

IT 79-10-7P, Acrylic acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(manufacture of metal oxide catalysts and acrylic acid with them)

IT 74-98-6, Propane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(manufacture of metal oxide catalysts and acrylic acid with them)

L38 ANSWER 9 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2000:564783 HCAPLUS

DN 133:335477

ED Entered STN: 16 Aug 2000

TI Selective oxidation of light alkanes over hydrothermally synthesized Mo-V-M-O (M = Al, Ga, Bi, Sb, and Te) oxide catalysts

AU Ueda, W.; Oshihara, K.

CS Department of Materials Science and Engineering, Science University of Tokyo in Yamaguchi, Yamaguchi, 765-0884, Japan

SO Applied Catalysis, A: General (2000), 200(1-2), 135-143

CODEN: ACAGE4; ISSN: 0926-860X

PB Elsevier Science B.V.

DT Journal

- LA English  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 37, 67
- AB Selective oxidns. of ethane to ethene and acetic acid and of propane to acrylic acid were carried out over hydrothermally synthesized Mo-V-M-O (M = Al, Ga, Bi, Sb, and Te) complex metal oxide catalysts. All the synthesized solids were rod-shaped crystallites and gave a common XRD peak corresponding to 4.0 Å d-spacing. From the different XRD patterns at low angle region below 10° and from the different shape of the cross-section of the rod crystal obtained by SEM, the solids were classified into two groups: Mo-V-M-O (M = Al, possibly Ga and Bi) and Mo-V-M-O (M=Sb, and Te). The former catalyst was moderately active for the ethane oxidation to ethene and to acetic acid. On the other hand the latter was found to be extremely active for the oxidative dehydrogenation. The Mo-V-M-O (M = Sb, and Te) catalysts were also active for the propane oxidation to acrylic acid. It was found that the grinding of the catalysts after heat-treatment at 600°C in N<sub>2</sub> increased the conversions of propane and enhanced the selectivity to acrylic acid. Structural arrangement of the catalytic functional components on the surface of the cross-section of the rod-shaped catalysts seems to be important for the oxidation activity and selectivity.
- ST selective oxidn ethane propane metal oxide catalyst  
 IT Rare earth metals, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (complexes with other metals; selective oxidation of light alkanes over hydrothermally synthesized metal oxide catalysts)
- IT Oxidation  
 Oxidation catalysts  
 (selective; selective oxidation of light alkanes over hydrothermally synthesized metal oxide catalysts)
- IT 7440-05-3, Palladium, uses 7440-62-2, Vanadium, uses 7631-86-9, Silica, uses 11075-35-7, Titanium vanadium oxide 12673-88-0, Molybdenum tin oxide 13463-67-7, Titania, uses 50813-81-5, Bismuth molybdenum vanadium oxide 51931-41-0, Antimony molybdenum oxide phosphate 55521-81-8, Antimony molybdenum vanadium oxide 58834-75-6 61164-11-2, Vanadium oxide phosphate 128177-24-2, Molybdenum tantalum vanadium oxide phosphate 128220-99-5, Cesium iron molybdenum vanadium oxide phosphate 130040-37-8, Vanadium zirconium oxide phosphate 133854-68-9 145054-98-4, Molybdenum niobium vanadium oxide 146569-47-3, Molybdenum tellurium vanadium oxide 146569-48-4, Molybdenum niobium tellurium vanadium oxide 152991-86-1, Molybdenum oxide phosphate 156166-12-0, Molybdenum vanadium oxide phosphate 193405-60-6, Antimony molybdenum niobium vanadium oxide 202708-41-6 210712-03-1, Bismuth molybdenum nickel oxide 222853-44-3, Aluminum molybdenum vanadium oxide 304017-47-8, Gallium molybdenum vanadium oxide 304017-48-9 304017-49-0, Phosphorus tellurium vanadium oxide 304017-50-3  
 RL: CAT (Catalyst use); USES (Uses)  
 (selective oxidation of light alkanes over hydrothermally synthesized metal oxide catalysts)
- IT 74-84-0, Ethane, reactions 74-98-6, Propane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (selective oxidation of light alkanes over hydrothermally synthesized metal oxide catalysts)
- IT 64-19-7P, Acetic acid, preparation 74-85-1P, Ethene, preparation 79-10-7P, Acrylic acid, preparation 124-38-9P, Carbon dioxide, preparation 630-08-0P, Carbon monoxide, preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (selective oxidation of light alkanes over hydrothermally synthesized metal oxide catalysts)

RE.CNT 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE

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- (2) Ai, M; J Chem Soc, Chem Commun 1986, P786 HCAPLUS
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- (4) Bp Chemical; JP 04257528 1992 HCAPLUS
- (5) Bp Chemical; US 5260250 1993 HCAPLUS
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- (12) Mitsubishi Chemicals; JP 1036311 1998
- (13) Mitsubishi Chemicals; JP 1045643 1998
- (14) Mitsubishi Chemicals; JP 1045664 1998
- (15) Mitsubisi Chemical; US 5472925 1995 HCAPLUS
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- (19) Rhone-Poulenc Chimie; JP 769969 1995
- (20) Rhone-Poulenc Chimie; JP 852359 1996
- (21) Rohm; US 4260822 1981 HCAPLUS
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- (23) Thornsteinson, E; J Catal 1978, V52, P116
- (24) Ucc; JP 6485945 1988
- (25) Ueda, W; Chem Commun 1999, P517
- (26) Ueda, W; Chem Lett 1995, P541 HCAPLUS
- (27) Ueda, W; Proceedings of the 11th International Congress on Catalysis, Stud Surf Sci Catal 1996, V101, P1065 HCAPLUS
- (28) Ushukubo, T; J Catal 1997, V169, P394
- (29) Ushukubo, T; Stud Surf Sci Catal 1997, V112, P473

L38 ANSWER 10 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2000:201111 HCAPLUS

DN 132:237515

ED Entered STN: 29 Mar 2000

TI Gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidation

IN Cirjak, Larry M.; Venturelli, Anne; Cassidy, Timothy J.; Pepera, Marc A.; Drenski, Tama L.

PA The Standard Oil Company, USA

SO U.S., 6 pp.

CODEN: USXXAM

DT Patent

LA English

IC ICM B01J023-00

ICS C07C253-00

INCL 502311000

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 23, 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6043185	A	20000328	US 1999-285384	19990402 <--
	WO 2000059869	A1	20001012	WO 2000-US4620	20000223 <--
	W: BG, BR, CA, CN, IN, JP, KR, RO, RU, SG, TR, ZA				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
PRAI	US 1999-285384	A	19990402	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 6043185	ICM	B01J023-00
	ICS	C07C253-00
	INCL	502311000
US 6043185	NCL	502/311.000; 502/312.000; 558/321.000; 558/323.000; 558/325.000
	ECLA	B01J023/08; B01J023/18; B01J023/28; C07C253/24 <--
WO 2000059869	ECLA	B01J023/08; B01J023/18; B01J023/28; C07C253/24 <--

AB A catalyst composition useful in the manufacture of acrylonitrile/methacrylonitrile by the vapor phase reaction of propane/isobutane with O and NH<sub>3</sub>, wherein paraffin:NH<sub>3</sub>:O = 1.0:10:10 mol ratio, comprises MOaVbSbcGadXeOx ( X = As, Te, Se, Nb, Ta, W, Ti, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pd, Pt, B, In, Ce, Re, Ir, Ge, Sn, Bi, Y, Pr, an alkali metal, and an alkaline earth metal, Nb, Ce, Fe, Ge, Sn, In, As, Se, and B, especially preferred being Nb; a = 1; b = 0.0-0.99; c = 0.01-0.9; d = 0.01-0.5; e = 0.01-1.0; x is determined by the oxidation state of the cations present). Thus, a catalyst composition Mol.0V0.3Sb0.15Nb0.05Ga0.03Ox was prepared by heating a mix. comprising 17.33 NH<sub>4</sub>VO<sub>3</sub>, 10.79 Sb<sub>2</sub>O<sub>3</sub>, 86.17 (NH<sub>4</sub>)<sub>6</sub>Mo<sub>7</sub>O<sub>24</sub>, 15.62 Nb oxalate, and 1.39 g Ga<sub>2</sub>O<sub>3</sub> and tested with feed ratio propane/NH<sub>3</sub>/O/N/H<sub>2</sub>O 1.0/1.4/3.3/12.3/4.0 at 460°.

ST gallium molybdenum vanadium antimony oxide catalyst; metal oxide catalyst ammoxidn; acrylonitrile methacrylonitrile manuf catalyst

IT Reactors  
Reactors  
(fluidized-bed; gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

IT Ammoxidation catalysts  
(gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

IT Alkali metals, uses  
Alkaline earth metals  
RL: CAT (Catalyst use); USES (Uses)  
(gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

IT Fluidized beds  
Fluidized beds  
(reactors; gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

IT 7803-55-6 12024-21-4, Gallium oxide (Ga<sub>2</sub>O<sub>3</sub>) 12027-67-7 21348-59-4, Niobium oxalate  
RL: CAT (Catalyst use); USES (Uses)  
(gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

IT **261919-86-2**  
RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
(gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

IT 107-13-1P, Acrylonitrile, preparation 126-98-7P, Methacrylonitrile  
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
(gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

IT 74-98-6, Propane, reactions 75-28-5, Isobutane 115-07-1, Propylene, reactions 7664-41-7, Ammonia, reactions 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(gallium promoted molybdenum vanadium-antimony-oxide based catalyst for

selective paraffin ammoxidn.)

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Anon; DE 19835247 1999 HCAPLUS

L38 ANSWER 11 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2000:169369 HCAPLUS

DN 132:208269

ED Entered STN: 15 Mar 2000

TI Highly active and selective catalysts for the production of unsaturated nitriles, methods of making and using the same

IN Abdulwahed, Mazhar; El Yahyaoui, Khalid

PA Saudi Basic Industries Corporation, Saudi Arabia

SO U.S., 6 pp.

CODEN: USXXAM

DT Patent

LA English

IC ICM B01J023-00

ICS B01J023-32; B01J023-02; B01J023-16

INCL 502300000

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 67

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6037304	A	20000314	US 1999-228885	19990111 <--
	US 6124233	A	20000926	US 1999-431744	19991101 <--
	EP 1020433	A2	20000719	EP 2000-200009	20000105 <--
	EP 1020433	A3	20000816		
	EP 1020433	B1	20040407		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 2000229929	A2	20000822	JP 2000-2312	20000111 <--
	US 6486091	B1	20021126	US 2000-675599	20000929 <--
PRAI	US 1999-228885	A3	19990111	<--	
	US 1999-431744	A	19991101	<--	
	US 2000-189215P	P	20000314	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 6037304	ICM	B01J023-00
	ICS	B01J023-32; B01J023-02; B01J023-16
	INCL	502300000
US 6037304	NCL	502/300.000; 502/305.000; 502/306.000; 502/312.000; 502/313.000; 502/319.000; 502/321.000; 502/324.000; 502/325.000; 502/340.000; 502/353.000
	ECLA	B01J023/00B; B01J023/31; C07C253/26 <--
US 6124233	NCL	502/312.000; 558/321.000; 558/324.000
	ECLA	B01J023/00B; B01J023/31; C07C253/26 <--
EP 1020433	ECLA	B01J023/00B; B01J023/31; C07C253/26 <--
US 6486091	NCL	502/312.000; 502/311.000; 502/321.000; 502/353.000
	ECLA	B01J023/31; C07C253/26 <--

AB A catalyst system comprises a catalyst having the empirical formula of  $\text{BiaMobVc SbdNbeAfBgOx}$  (A =  $\geq 1$  element from groups VB, VIB, VIIB, VIII of the periodic table; B =  $\geq 1$  alkali, alkaline earth metal promoter selected from groups IA, IIA; a, b = 0.01-12; c = 0.01-2; d = 0.01-10; f = 0-1; g = 0-0.5; x = number of O required to satisfy the valency requirement of the elements present). Thus, an ammoxidn. catalyst of  $\text{BiMoNb0.1V0.175Sb0.35Ox/50\% SiO2}$  was prepared for conversion of propylene to acrylonitrile.

- ST ammoxidn catalyst niobium pentaoxide coversion propylene; vanadium molybdenum antimony niobium oxide catalyst; silica supported ammoxidn catalyst
- IT Aluminates  
Borates  
Carbonates, uses  
Pumice  
Silicates, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst support; highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)
- IT Ammoxidation catalysts  
(highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)
- IT Phosphates, uses  
RL: CAT (Catalyst use); USES (Uses)  
(inorg., catalyst support; highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)
- IT 409-21-2, Silicon carbide, uses 1314-23-4, Zirconia, uses 1318-93-0, Montmorillonite, uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 13463-67-7, Titania, uses 159995-97-8, Aluminum silicon oxide  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst support; highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)
- IT 1313-96-8, Niobium pentoxide **260557-95-7**  
RL: CAT (Catalyst use); USES (Uses)  
(highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)
- IT 107-13-1P, Acrylonitrile, preparation 126-98-7P, Methacrylonitrile  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)
- IT 115-07-1, Propylene, reactions 115-11-7, Isobutylene, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)

RE.CNT 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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- (3) Anon; EP 0407091 A1 1991 HCAPLUS
- (4) Anon; EP 0475351 A1 1992 HCAPLUS
- (5) Anon; EP 0480594 A2 1992 HCAPLUS
- (6) Anon; EP 0518548 A2 1992 HCAPLUS
- (7) Anon; EP 0573713 B1 1993 HCAPLUS
- (8) Anon; EP 0620205 A1 1994 HCAPLUS
- (9) Anon; EP 0627401 A1 1994 HCAPLUS
- (10) Aoki; US 4600541 1986 HCAPLUS
- (11) Bartek; US 5198580 1993 HCAPLUS
- (12) Blum; US 5300682 1994 HCAPLUS
- (13) Brazdil; US 4148757 1979 HCAPLUS
- (14) Decker; US 4339355 1982 HCAPLUS
- (15) Drenski; US 5688739 1997 HCAPLUS
- (16) Ebner; US 4405498 1983 HCAPLUS
- (17) Hatano; US 5049692 1991 HCAPLUS
- (18) Li; US 4040978 1977 HCAPLUS
- (19) Manyik; US 4596787 1986 HCAPLUS
- (20) Manyik; US 4899003 1990 HCAPLUS
- (21) McCain; US 4524236 1985 HCAPLUS
- (22) McCain; US 4568790 1986 HCAPLUS



- (23) McCain; US 5162578 1992 HCAPLUS  
 (24) Mekhtiev; US 4062885 1977  
 (25) Naglieri; US 3240805 1966  
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 (29) Thorsteinson; Journal of Catalysis 1978, V52, P116 HCAPLUS  
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L38 ANSWER 12 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1998:352802 HCAPLUS  
 DN 129:28336  
 ED Entered STN: 11 Jun 1998  
 TI Process for simultaneous preparation of acrylonitrile and acrylic acid  
 IN Kayou, Atsushi; Ihara, Tatsuya  
 PA Mitsubishi Chemical Corp., Japan  
 SO PCT Int. Appl., 29 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA Japanese  
 IC ICM C07C057-05  
 ICS C07C255-08; C07C253-24  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23, 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9822421	A1	19980528	WO 1997-JP4169	19971117 <--
	W: AU, CA, CN, ID, JP, KR, SG, US				
	RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2271421	AA	19980528	CA 1997-2271421	19971117 <--
	AU 9749661	A1	19980610	AU 1997-49661	19971117 <--
	EP 970942	A1	20000112	EP 1997-912475	19971117 <--
	EP 970942	B1	20040303		
	R: DE, GB				
	US 6166241	A	20001226	US 1999-284993	19990513 <--
PRAI	JP 1996-304502	A	19961115	<--	
	WO 1997-JP4169	W	19971117	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 9822421	ICM	C07C057-05
	ICS	C07C255-08; C07C253-24
WO 9822421	ECLA	C07C051/215+57/04; C07C253/24 <--
EP 970942	ECLA	C07C051/215+57/04; C07C253/24 <--
US 6166241	NCL	558/318.000; 562/549.000
	ECLA	C07C051/215+57/04; C07C253/24 <--

AB A process for simultaneous preparation of acrylonitrile (I) and acrylic acid (II) by gas-phase catalytic oxidation of propane with ammonia and oxygen in the presence of a metal oxide catalyst containing as the essential components V and  $\geq 1$  element selected among Te, Sb and Mo is characterized by regulating both the molar ratio of propane to ammonia and that of oxygen to ammonia each within the range of 2-10. Conducting the ammoxidn. of propane at the selected molar ratios of propane to ammonia and oxygen to ammonia enables the simultaneous preparation of I and II at a high total selectivity and in a high total yield. Further, the catalytic activity can be retained for a long period, so that the ammoxidn. can be conducted efficiently and stably for a long period.

ST ammoxidn propane acrylonitrile prepn; acrylic acid prepn oxidn propane; gas phase oxidn catalyst propane; vanadium tellurium antimony molybdenum

- oxide catalyst  
IT Ammoxidation  
Ammoxidation catalysts  
Oxidation  
Oxidation catalysts  
(simultaneous preparation of acrylonitrile and acrylic acid by gas-phase catalytic oxidation of propane)  
IT 146569-48-4 146569-65-5  
RL: CAT (Catalyst use); USES (Uses)  
(simultaneous preparation of acrylonitrile and acrylic acid by gas-phase catalytic oxidation of propane)  
IT 79-10-7P, Acrylic acid, preparation 107-13-1P, Acrylonitrile, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(simultaneous preparation of acrylonitrile and acrylic acid by gas-phase catalytic oxidation of propane)  
IT 74-98-6, Propane, reactions 7664-41-7, Ammonia, reactions 7782-44-7, Oxygen, reactions  
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)  
(simultaneous preparation of acrylonitrile and acrylic acid by gas-phase catalytic oxidation of propane).

RE.CNT 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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- (2) Mitsubishi Chemical Corp; EP 608838 A2 1995 HCAPLUS
- (3) Mitsubishi Chemical Corp; JP 710801 A 1995
- (4) Mitsubishi Chemical Corp; JP 08225506 A 1996 HCAPLUS
- (5) Mitsubishi Chemical Corp; JP 857319 A 1996
- (6) Mitsubishi Chemical Corp; JP 09157241 A 1997 HCAPLUS
- (7) Mitsubishi Chemical Corp; EP 767164 A1 1997 HCAPLUS
- (8) Mitsubishi Chemical Industries Ltd; JP 05148212 A 1993 HCAPLUS
- (9) Mitsubishi Chemical Industries Ltd; JP 05279313 A 1993 HCAPLUS
- (10) Mitsubishi Chemical Industries Ltd; CN 1066445 A 1993
- (11) Mitsubishi Chemical Industries Ltd; CN 1069723 A 1993 HCAPLUS
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- (13) Mitsubishi Chemical Industries Ltd; TW 218008 A 1993
- (14) Mitsubishi Chemical Industries Ltd; EP 512846 A1 1993 HCAPLUS
- (15) Mitsubishi Chemical Industries Ltd; US 5231214 A 1993 HCAPLUS
- (16) Mitsubishi Chemical Industries Ltd; US 5281745 A 1993 HCAPLUS
- (17) Mitsubishi Chemical Industries Ltd; EP 529853 A2 1993 HCAPLUS
- (18) Mitsubishi Chemical Industries Ltd; BR 9201749 A 1993 HCAPLUS
- (19) Mitsubishi Chemical Industries Ltd; BR 9203080 A 1993 HCAPLUS
- (20) Mitsui Toatsu Chemicals Inc; JP 05213848 A 1993 HCAPLUS
- (21) Mitsui Toatsu Chemicals Inc; JP 06199768 A 1994 HCAPLUS
- (22) The Standard Oil Co; JP 01268668 A 1989 HCAPLUS
- (23) The Standard Oil Co; CN 1036913 A 1989
- (24) The Standard Oil Co; CN 1061731 A 1989 HCAPLUS
- (25) The Standard Oil Co; EP 337028 A1 1989 HCAPLUS
- (26) The Standard Oil Co; US 4788317 A 1989 HCAPLUS
- (27) The Standard Oil Co; BR 8801868 A 1989 HCAPLUS
- (28) The Standard Oil Co; JP 05293374 A 1993 HCAPLUS
- (29) The Standard Oil Co; CN 1063240 A 1993 HCAPLUS
- (30) The Standard Oil Co; CA 2056923 A 1993 HCAPLUS
- (31) The Standard Oil Co; TW 206926 A 1993
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- (33) The Standard Oil Co; US 5094989 A 1993 HCAPLUS
- (34) The Standard Oil Co; BR 9105578 A 1993 HCAPLUS
- (35) The Standard Oil Co; JP 09104666 A 1997 HCAPLUS
- (36) The Standard Oil Co; SG 43371 A1 1997

- (37) The Standard Oil Co; US 5576469 A 1997 HCAPLUS  
 (38) The Standard Oil Co; EP 747349 A1 1997 HCAPLUS  
 (39) The Standard Oil Co; ZA 9604551 A 1997 HCAPLUS  
 (40) The Standard Oil Co; KR 97001312 A 1997  
 (41) Toa Gosei Co Ltd; JP 09316023 A 1997 HCAPLUS

L38 ANSWER 13 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1998:197888 HCAPLUS

DN 128:244499

ED Entered STN: 06 Apr 1998

TI Manufacture of  $\alpha,\beta$ -unsaturated nitriles from alkanes and ammonia at high selectivity

IN Ushikubo, Takashi; Oshima, Kazunori; Ihara, Tatsuya; Kayo, Atsushi; Sawaki, Itaru

PA Mitsubishi Chemical Industries Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 8 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C255-08

ICS B01J023-28; B01J027-057; C07C253-24; C07B061-00

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 45

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10081660	A2	19980331	JP 1996-255338	19960906 <--
PRAI	JP 1996-255338		19960906	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 10081660	ICM	C07C255-08
	ICS	B01J023-28; B01J027-057; C07C253-24; C07B061-00

AB The  $\alpha,\beta$ -unsatd. nitriles are manufactured by catalytic gas-phase oxidation of C3-8 alkanes with NH3 in the presence of metal oxide catalysts, where the gas component molar ratio C3-8 alkane/NH3/O2/dilute gas is . The process for  $\alpha,\beta$ -unsatd. nitriles comprises supplying gas mixture of C3-8 alkane/NH3/O2/dilute with mole ratio 1/0.01-0.9/0.1-1.8/0-9 to a reactor having metal oxide catalyst; separating the nitriles from gaseous reaction products flowing out of the reactors; separating and recovering unreacted alkanes-containing gas; and feeding the recycled gas into the reactor. Thus, a mixture of 1/0.4/0.8/3.2 propane/NH3/O2/N2 (propane content 18.5 vol%) was supplied into a reactor filled SiO2-supported Mo1V0.3Te0.23Nb0.12On catalyst 100 mg and reacted at 420° to give 18.9% acrylonitrile in catalytic selectivity 65.3% (in propane conversion 28.9%).

ST unsatd nitrile manuf selectivity; metal oxide catalyst alkane ammonia oxidn; propane ammonia gas phase catalytic oxidn; acrylonitrile manuf gas phase catalytic oxidn

IT Alkanes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(C3-8; manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)

IT Oxidation

(gas-phase; manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)

IT Oxidation catalysts

(manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by

- gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)
- IT Nitriles, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
( $\alpha,\beta$ -unsatd.; manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)
- IT 7631-86-9, Silica, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst support; manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)
- IT 146569-48-4, Molybdenum niobium tellurium vanadium oxide  
204920-27-4  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst; manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)
- IT 1309-64-4, Antimony trioxide, reactions 7803-55-6, Ammonium metavanadate  
11120-48-2, Telluric acid 12027-67-7, Ammonium paramolybdate  
37382-23-3, Cerium hydroxide 60086-69-3  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(in preparation of catalysts for gas-phase oxidation of alkanes)
- IT 107-13-1P, Acrylonitrile, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)
- IT 74-98-6, Propane, reactions 75-28-5, Isobutane 7664-41-7, Ammonia, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(manufacture of  $\alpha,\beta$ -unsatd. nitriles at high selectivity by gas-phase oxidation of alkanes and ammonia in the presence of metal oxides)
- L38 ANSWER 14 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 1998:93332 HCAPLUS  
DN 128:155780  
ED Entered STN: 18 Feb 1998  
TI Oxidative conversion of LPG to olefins with mixed oxide catalysts: surface chemistry and reactions network  
AU Landau, M. V.; Kaliya, M. L.; Gutman, A.; Kogan, L. O.; Herskowitz, M.; Van Den Oosterkamp, P. F.  
CS Blechner Center for Industrial Catalysis and Process Development, Ben-Gurion University of the Negev, Beer Sheva, 84105, Israel  
SO Studies in Surface Science and Catalysis (1997), 110(3rd World Congress on Oxidation Catalysis, 1997), 315-326  
CODEN: SSCTDM; ISSN: 0167-2991  
PB Elsevier Science B.V.  
DT Journal  
LA English  
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 51  
AB The catalytic performance of 3 mixed oxide catalytic systems V-Mo-, V-Mg and RE-Li-Halogen (RLH) in LPG oxidative conversion was measured at different O/LPG ratios, temps. and WHSV. At high LPG conversions V-Mo-based catalysts yielded low olefins selectivity and high LPG combustion (CB), V-Mg - medium olefins selectivity by oxidative dehydrogenation (ODH) route and medium LPG CB selectivity, while RLH catalysts displayed high olefins selectivity by ODH and cracking (CR)

routes at low CB. TP-reaction expts. and the effects of O partial pressure on catalytic performance indicated a dynamic interaction of surface O in the ODH, CB and CR routes. ESCA and TPD measurements detected three types of surface O with different nucleophilicity and bonding strength. Their distribution correlated with LPG conversion selectivities. A correlation between catalysts acidity, the surface exposed metal cations concentration and the productivity by the CR route was derived. The surface basicity was also significant in olefins productivity by the ODH and CR routes. The selectivity of LPG oxidative reactions were attributed to different intermediates formed on the surface as a result of interaction of C3-C4 paraffins with O atoms of different nucleophilicity. Both the redox balance of surface metal cations and the acidity-basicity balance are proposed to be significant.

ST mixed oxide catalyst oxidn LPG olefin

IT Petroleum products

RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(gases, liquefied; surface chemical and reactions network in oxidative conversion of LPG to olefins with mixed oxide catalysts)

IT Oxides (inorganic), processes

RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(mixed; surface chemical and reactions network in oxidative conversion of LPG to olefins with mixed oxide catalysts)

IT Oxidation

Oxidation catalysts

(surface chemical and reactions network in oxidative conversion of LPG to olefins with mixed oxide catalysts)

IT Alkenes, preparation

RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)

(surface chemical and reactions network in oxidative conversion of LPG to olefins with mixed oxide catalysts)

IT 12209-58-4, Molybdenum vanadium oxide 37359-32-3, Magnesium vanadium oxide 39406-99-0, Lithium magnesium vanadium oxide 202708-41-6  
202708-42-7, Calcium molybdenum vanadium oxide 202708-45-0, Magnesium sulfur vanadium oxide 202708-46-1 202708-48-3 202708-49-4  
202708-50-7, Cerium lithium magnesium chloride oxide 202708-51-8  
202708-52-9, Dysprosium lithium magnesium oxide 202708-53-0  
202708-54-1

RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(surface chemical and reactions network in oxidative conversion of LPG to olefins with mixed oxide catalysts)

RE.CNT 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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- (2) Bielanski, A; Oxygen in Catalysis 1991
- (3) Cavani, F; Catal Today 1995, V24, P307 HCAPLUS
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- (15) Sokolovskii, V; Catal Rev-Sci Eng 1990, V32(1&2), P1  
 (16) Wang, D; J Catal 1995, V151, P155 HCAPLUS  
 (17) Ziolkowski, J; J Catal 1983, V81, P298 HCAPLUS

L38 ANSWER 15 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1998:81020 HCAPLUS  
 DN 128:209443  
 ED Entered STN: 12 Feb 1998  
 TI Manufacture of catalyst for catalytic oxidation of hydrocarbons  
 IN Ushikubo, Takashi; Oshima, Kazusuke; Ogoshi, Toru; Numasawa, Satomi;  
 Kinoshita, Hisao; Watanabe, Akira  
 PA Mitsubishi Chemical Industries Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 9 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM B01J023-28  
 ICS B01J023-30; B01J023-34; B01J023-64; B01J023-88; B01J027-057;  
 B01J027-199; C07B061-00; C07C253-24; C07C255-08  
 CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
 Section cross-reference(s): 45

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10028862	A2	19980203	JP 1997-89569	19970408 <--
PRAI	JP 1996-96578	A	19960418	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 10028862	ICM	B01J023-28
	ICS	B01J023-30; B01J023-34; B01J023-64; B01J023-88; B01J027-057; B01J027-199; C07B061-00; C07C253-24; C07C255-08

AB The catalysts for the catalytic oxidation of hydrocarbons, are prepared by impregnating a solution containing W, Mo, Cr, Zr, etc., onto the composite metal oxide represented by an empirical formula  $Mo_aV_bX_xZ_zO_n$  [ $X = \text{Te and Sb}$ ;  $Z = \text{Nb, Ta, W, Ti, etc.}$ ;  $b/a = 0.01-1$ ,  $x/a = 0.01-1$ ,  $z/a = 0-1$ ].

ST catalyst catalytic oxidn hydrocarbon ammoxidn; molybdenum niobium tellurium tungsten vanadium oxide; phosphorus silicon cerium catalyst propane acrylonitrile; ammoxidn catalyst propane acrylonitrile

IT Ammoxidation  
 Ammoxidation catalysts  
 (manufacture of catalyst for catalytic oxidation of hydrocarbon)

IT Oxides (inorganic), uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (manufacture of catalyst for catalytic oxidation of hydrocarbon)

IT Hydrocarbons, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of catalyst for catalytic oxidation of hydrocarbon)

IT 149920-39-8, Cerium molybdenum niobium tellurium vanadium oxide  
 204124-61-8, Molybdenum niobium silicon tellurium tungsten vanadium oxide  
 204124-63-0 204125-27-9  
 RL: CAT (Catalyst use); USES (Uses)  
 (manufacture of catalyst for catalytic oxidation of hydrocarbon)

IT 107-13-1P, Acrylonitrile, preparation  
 RL: PNU (Preparation, unclassified); PREP (Preparation)  
 (manufacture of catalyst for catalytic oxidation of hydrocarbon)

IT 74-98-6, Propane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)

(manufacture of catalyst for catalytic oxidation of hydrocarbon)

L38 ANSWER 16 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1997:702010 HCAPLUS

DN 127:331206

ED Entered STN: 07 Nov 1997

TI Preparation of isobutylene, methacrolein, and/or methacrylic acid

IN Okusako, Akinori; Ui, Toshiaki; Nagai, Koichi

PA Sumitomo Chemical Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C07C011-09

ICS B01J023-28; C07C005-48; C07C027-12; C07C045-28; C07C047-22;

C07C057-05; C07B061-00

CC 23-16 (Aliphatic Compounds)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09278680	A2	19971028	JP 1996-88029	19960410 <--
PRAI	JP 1996-88029		19960410	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 09278680	ICM	C07C011-09
	ICS	B01J023-28; C07C005-48; C07C027-12; C07C045-28; C07C047-22; C07C057-05; C07B061-00
JP 09278680	ECLA	C07C005/48+11/09; C07C045/35+47/22 <--

AB Alkene and/or O-containing compds. are prepared by catalytic oxidation of isobutane

with mol. O in gas phase in the presence of MoaVbXcYdZeOf (X = Sb, Te; Y =  $\geq 1$  elements chosen from As, B, and Ge; Z =  $\geq 1$  elements chosen from K, Cs, Rb, Ca, Mg, Ti, Cr, Mn, Fe, Co, Ni, Cu, Ag, Bi, Al, Ga, In, Sn, Zn, La, Ce, Y, W, Nb, and Ta) catalysts. An ion-exchanged water solution of Nb(HC2O4)5.nH2O and aqueous vanadyl oxalate containing 2 mol/l

vanadium

was mixed with (NH4)6Mo7O24.4H2O and Sb2O3, neutralized using aqueous NH3, concentrated to dryness by heating, calcined at 600° for 2 h to give Mo12V3Sb9Nb1.5Ox. A gaseous mixt containing isobutane, O, N, and steam with 25, 12, 33, and 30 %, resp, was fed into the catalyst at 425° and a space velocity 1000 h-1 under 152 kPa to give isobutylene, methacrolein, and methacrylic acid with 11.9%, 23.8%, and 7.8% selectivity, resp., at 6.3% conversion.

ST isobutane oxidn molybdenum catalyst; vanadium catalyst oxidn isobutane; alkene oxygen contg compd prepn; isobutylene methacrolein methacrylic acid prepn

IT Oxidation catalysts

(preparation of isobutylene, methacrolein, and methacrylic acid by oxidation of

isobutane using catalysts)

IT 7440-38-2, Arsenic, uses 7440-42-8, Boron, uses 55521-81-8, Antimony molybdenum vanadium oxide 146569-48-4, Molybdenum niobium tellurium vanadium oxide 193405-60-6, Antimony molybdenum niobium vanadium oxide 198018-00-7 198018-02-9 **198018-04-1**

RL: CAT (Catalyst use); USES (Uses)

(preparation of isobutylene, methacrolein, and methacrylic acid by oxidation of

isobutane using catalysts)

IT 78-85-3P, Methacrolein 79-41-4P, Methacrylic acid, preparation

115-11-7P, Isobutylene, preparation

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(preparation of isobutylene, methacrolein, and methacrylic acid by oxidation of

isobutane using catalysts)

IT 75-28-5, Isobutane 7782-44-7, Oxygen, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of isobutylene, methacrolein, and methacrylic acid by oxidation of

isobutane using catalysts)

L38 ANSWER 17 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1996:34864 HCAPLUS

DN 124:147122

ED Entered STN: 18 Jan 1996

TI Molybdenum oxide ammoxidation catalyst for the production of nitriles

IN Ushikubo, Takashi; Oshima, Kazunori; Kayo, Atsushi; Umezawa, Tiaki;

Kiyono, Ken-ichi; Sawaki, Itaru; Nakamura, Hiroya

PA Mitsubishi Chemical Corporation, Japan

SO U.S., 19 pp. Cont.-in-part of U.S. Ser. No. 121,564, abandoned.

CODEN: USXXAM

DT Patent

LA English

IC ICM B01J023-28

ICS B01J023-22

INCL 502312000

CC 35-2 (Chemistry of Synthetic High Polymers)

FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5472925	A	19951205	US 1994-193403	19940207 <--
	JP 05208136	A2	19930820	JP 1992-211425	19920807 <--
	JP 3331629	B2	20021007		
	US 5281745	A	19940125	US 1992-926173	19920807 <--
	JP 05279313	A2	19931026	JP 1992-216016	19920813 <--
	JP 3168716	B2	20010521		
	JP 06228074	A2	19940816	JP 1993-18923	19930205 <--
	JP 3306950	B2	20020724		
PRAI	JP 1991-199573	A	19910808	<--	
	JP 1992-18962	A	19920204	<--	
	US 1992-926173	A3	19920807	<--	
	JP 1993-18923	A	19930205	<--	
	US 1993-121564	B2	19930916	<--	

#### CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 5472925	ICM	B01J023-28
	ICS	B01J023-22
	INCL	502312000
US 5472925	NCL	502/312.000; 502/311.000; 502/319.000; 502/321.000; 502/324.000; 502/326.000; 502/329.000; 502/353.000; 502/354.000; 558/319.000
	ECLA	B01J023/00B; B01J027/057T; C07C253/24
US 5281745	NCL	558/319.000

AB The title catalysts for the production of a nitrile from an alkane, is represented by MoaVbTecXxOn, wherein X is  $\geq$  element selected from Nb, Ta, W, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pd, Pt, Sb, Bi, B and Ce, when a = 1, b = 0.01-1.0, c = 0.01-1.0, x = 0.01-1.0, and n is a number such that the total valency of the metal elements is satisfied. The



catalyst has a specified X-ray diffraction pattern. Propane was ammoxidized to acrylonitrile using a MoV<sub>0.3</sub>Te<sub>0.23</sub>Nb<sub>0.12</sub>On catalyst.

ST alkane ammoxidn nitrile; molybdenum catalyst ammoxidn

IT Ammoxidation catalysts  
(molybdenum oxide ammoxidn. catalyst for the production of nitriles)

IT Nitriles, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(molybdenum oxide ammoxidn. catalyst for the production of nitriles)

IT Alkanes, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(molybdenum oxide ammoxidn. catalyst for the production of nitriles)

IT 146569-48-4, Molybdenum niobium tellurium vanadium oxide 146569-51-9, Aluminum molybdenum tellurium vanadium oxide 146569-54-2, Antimony molybdenum tellurium vanadium oxide 149920-42-3, Molybdenum niobium palladium tellurium vanadium oxide  
RL: CAT (Catalyst use); USES (Uses)  
(molybdenum oxide ammoxidn. catalyst for the production of nitriles)

IT 107-13-1P, Acrylonitrile, preparation 126-98-7P, Methacrylonitrile  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(molybdenum oxide ammoxidn. catalyst for the production of nitriles)

IT 74-98-6, Propane, reactions 75-28-5, Isobutane 1304-76-3, Bismuth oxide, reactions 1306-38-3, Cerium oxide, reactions 1308-38-9, Chromium oxide, reactions 1310-53-8, Germanium oxide, reactions 1314-36-9, Yttrium oxide, reactions 1317-36-8, Lead oxide, reactions 1332-81-6, Tetravalent antimony oxide 7664-41-7, Ammonia, reactions 7784-27-2, Aluminum nitrate nonahydrate 7791-08-4 7803-55-6, Ammonium metavanadate 10035-06-0 10043-35-3, Orthoboric acid, reactions 10102-05-3, Palladium nitrate 11120-48-2, Telluric acid 12027-67-7, Ammonium paramolybdate 168547-43-1  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(molybdenum oxide ammoxidn. catalyst for the production of nitriles)

L38 ANSWER 18 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1995:522594 HCAPLUS

DN 122:266250

ED Entered STN: 04 May 1995

TI Unsaturated carboxylic acid by oxidation of alkane using certain mixed metal oxides.

IN Ushikubo, Takashi; Nakamura, Hiroya; Koyasu, Yukio; Wajiki, Shin

PA Mitsubishi Kasei Corp., Japan

SO Eur. Pat. Appl., 9 pp.  
CODEN: EPXXDW

DT Patent

LA English

IC ICM C07C057-04  
ICS C07C057-05; B01J023-28; C07C051-215

CC 35-2 (Chemistry of Synthetic High Polymers)  
Section cross-reference(s): 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 608838	A2	19940803	EP 1994-101067	19940125 <--
	EP 608838	A3	19941214		
	EP 608838	B1	19970416		
	R: DE, FR, GB				
	JP 07010801	A2	19950113	JP 1993-153651	19930624 <--
	JP 3237314	B2	20011210		
	JP 06279351	A2	19941004	JP 1993-308013	19931208 <--
	JP 3334296	B2	20021015		
	US 5380933	A	19950110	US 1994-187719	19940128 <--

PRAI JP 1993-12616 A 19930128 <--  
 JP 1993-153651 A 19930624 <--  
 JP 1993-308013 A 19931208 <--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 608838	ICM	C07C057-04
	ICS	C07C057-05; B01J023-28; C07C051-215
EP 608838	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J027/057T; C07C051/215; C07C051/215+57/04 <--
US 5380933	NCL	562/549.000; 562/547.000
	ECLA	B01J023/00B; B01J023/20; B01J023/28; B01J027/057T; C07C051/215; C07C051/215+57/04 <--
AB	A method for producing an unsatd. carboxylic acid, especially (meth)acrylic acid, comprises subjecting an alkane to a vapor phase catalytic oxidation in the presence of a catalyst containing a mixed metal oxide of Mo, V, Te, O and X (X = $\geq 1$ of Nb, Ta, W, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pd, Pt, Sb, Bi, B, In and Ce), satisfying the following formulas: $0.25 < r_{Mo} < 0.98$ ; $0.003 < r_V < 0.5$ ; $0.003 < r_{Te} < 0.5$ ; $0.003 < r_X < 0.5$ ; wherein r = molar fractions of Mo, V, Te and X, resp. C <sub>3</sub> H <sub>6</sub> :air 1:15 at 400° and SV 1734 h <sup>-1</sup> in the presence of Mo <sub>1</sub> V <sub>0.3</sub> Te <sub>0.23</sub> Nb <sub>0.12</sub> O <sub>n</sub> (preparation given) gave conversion of C <sub>3</sub> H <sub>6</sub> 75.3% and selectivity for acrylic acid 42.4%.	
ST	propane oxidn catalyst acrylic acid manuf; molybdenum oxide catalyst oxidn; vanadium oxide catalyst oxidn; tellurium oxide catalyst oxidn; niobium oxide catalyst oxidn	
IT	Oxidation catalysts (mixed metal oxides for conversion of alkane to unsatd. carboxylic acid)	
IT	7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-03-1, Niobium, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses 7440-25-7, Tantalum, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses 7440-36-0, Antimony, uses 7440-42-8, Boron, uses 7440-45-1, Cerium, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-62-2, Vanadium, uses 7440-67-7, Zirconium, uses 7440-69-9, Bismuth, uses 7440-74-6, Indium, uses 13494-80-9, Tellurium, uses RL: CAT (Catalyst use); USES (Uses) (catalyst component in mixed metal oxide for conversion of alkane to unsatd. carboxylic acid)	
IT	149920-40-1, Bismuth molybdenum niobium tellurium vanadium oxide RL: CAT (Catalyst use); USES (Uses) (catalyst for conversion to acrylic acid)	
IT	79-10-7P, Acrylic acid, preparation RL: IMF (Industrial manufacture); PREP (Preparation) (catalyst for conversion to acrylic acid)	
IT	74-98-6, Propane, reactions RL: RCT (Reactant); RACT (Reactant or reagent) (catalyst for conversion to acrylic acid)	
IT	146569-48-4, Molybdenum niobium tellurium vanadium oxide RL: CAT (Catalyst use); PRP (Properties); USES (Uses) (oxidation catalyst for conversion of propane to acrylic acid)	
L38	ANSWER 19 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN	
AN	1993:539968 HCAPLUS	
DN	119:139968	
ED	Entered STN: 02 Oct 1993	
TI	Process for producing nitriles	
IN	Ushikubo, Takashi; Oshima, Kazunori; Kayo, Atsushi; Umezawa, Tiaki; Kiyono, Kenichi; Sawaki, Itaru	

PA Mitsubishi Kasei Corp., Japan  
 SO Eur. Pat. Appl., 39 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM C07C253-24  
 ICS B01J027-057  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 529853	A2	19930303	EP 1992-307260	19920807 <--
	EP 529853	A3	19930519		
	EP 529853	B1	19960228		
	R: DE, FR, GB, IT, NL				
	BR 9203080	A	19930330	BR 1992-3080	19920807 <--
	JP 05208136	A2	19930820	JP 1992-211425	19920807 <--
	JP 3331629	B2	20021007		
	CN 1069723	A	19930310	CN 1992-109282	19920808 <--
	CN 1031640	B	19960424		
	JP 05279313	A2	19931026	JP 1992-216016	19920813 <--
	JP 3168716	B2	20010521		
PRAI	JP 1991-199573	A	19910808	<--	
	JP 1992-18962	A	19920204	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 529853	ICM	C07C253-24
	ICS	B01J027-057
EP 529853	ECLA	B01J023/00B; B01J027/057T; C07C253/24 <--

AB A nitrile (especially H<sub>2</sub>C:CHCN) is prepared by oxidation of an alkane and gaseous NH<sub>3</sub>

containing a complex metal oxide catalyst; the catalyst has x-ray diffraction peaks at  $2\theta$   $22.1 \pm 1.0$ ,  $28.2 \pm 1.0$ ,  $36.2 \pm 0.3$ ,  $45.2 \pm 0.3$ ,  $50.0^\circ \pm 0.3$ . In an example, H<sub>2</sub>C:CHCN was prepared in a gas-phase reaction of propane/NH<sub>3</sub>/air at 1:1.2:15 molar ratio at 420° and space velocity 1000 h<sup>-1</sup> in presence of MoV<sub>0.4</sub>Te<sub>0.2</sub>Nb<sub>0.1</sub>O<sub>4.25</sub> (calcined at 620°); conversion of propane 79.4%; selectivity for H<sub>2</sub>C:CHCN 63.5%; and yield of H<sub>2</sub>C:CHCN 50.4%.

ST acrylonitrile prepn propane ammonia; ammoxidn catalyst mixed metal oxide; tellurium mixed metal oxide ammoxidn catalyst

IT Alkanes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(ammoxidn. of, to unsatd. nitriles, mixed metal oxide catalysts for)

IT Ammoxidation catalysts

(molybdenum tellurium vanadium oxides, for nitrile preparation from alkanes and ammonia)

IT Ammoxidation

(of alkanes, to unsatd. nitriles, process for)

IT Nitriles, preparation

RL: PREP (Preparation)

(unsatd., preparation of, by ammoxidn. of alkanes, mixed metal oxide catalysts for)

IT 74-98-6, Propane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(ammoxidn. of, to acrylonitrile, mixed metal oxide catalysts for)

IT 75-28-5, Isobutane

RL: PROC (Process)

(ammoxidn. of, to methacrylonitrile, mixed metal oxide catalysts for)

IT 146569-48-4 146569-51-9 146569-54-2 149920-38-7

149920-39-8 149920-40-1 149920-41-2

149920-42-3

RL: CAT (Catalyst use); USES (Uses)

(catalysts, for ammoxidn. of alkanes with air and ammonia)

IT 126-98-7P, Methacrylonitrile

RL: IMF (Industrial manufacture); PREP (Preparation)

(manufacture of, by ammoxidn. of isobutane, mixed metal oxide catalysts for)

IT 107-13-1P, 2-Propenenitrile, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)

(manufacture of, by ammoxidn. of propane, mixed metal oxide catalysts for)

IT 7664-41-7, Ammonia, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(oxidation of alkanes with air and, to unsatd. nitriles)

L38 ANSWER 20 OF 20 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1993:149827 HCAPLUS

DN 118:149827

ED Entered STN: 13 Apr 1993

TI Process for producing nitriles

IN Ushikubo, Takashi; Oshima, Kazunori; Umezawa, Tiaki; Kiyono, Kenichi

PA Mitsubishi Kasei Corp., Japan

SO Eur. Pat. Appl., 12 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM C07C253-24

ICS C07C255-08

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

Section cross-reference(s): 23, 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 512846	A1	19921111	EP 1992-304144	19920508 <--
	EP 512846	B1	19950412		
	R: DE, FR, GB, IT, NL				
	JP 05148212	A2	19930615	JP 1992-114884	19920507 <--
	JP 3235177	B2	20011204		
	US 5231214	A	19930727	US 1992-880687	19920508 <--
	CN 1066445	A	19921125	CN 1992-103439	19920509 <--
	CN 1028752	B	19950607		
PRAI	JP 1991-104382	A	19910509	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES	
EP 512846	ICM	C07C253-24	
	ICS	C07C255-08	
EP 512846	ECLA	C07C253/24	<--
US 5231214	NCL	558/319.000; 558/318.000	<--

OS CASREACT 118:149827

AB A process for producing a nitrile, comprises subjecting an alkane and ammonia in the gaseous state to catalytic oxidation in the presence of MoVbTecNbDXxOn wherein: X is at least one of Mg, Ca, Sr, Ba, Al, Ga, Tl, In, Ti, Zr, Hf, Ta, Cr, Mn, W, Fe, Ru, Co, Rh, Ni, Pd, Pt, Zn, Sn, Pb, As, Sb, Bi, La and Ce; b is from 0.01 to 1.0; c is from 0.01 to 1.0; d is from 0 to 1.0; x is from 0.0005 to 1.0; and n is a number such that the total valency of the metal elements is satisfied. Thus, a feed gas of 1:1.2:10 propane/NH<sub>3</sub>/air at a space velocity of 1000 h<sup>-1</sup> at 440° over MoV0.4Te0.2Nb0.1Mn0.1On gave 23.9% acrylonitrile with 57.5% conversion of propane.

ST nitrile; acrylonitrile; ammoxidn alkane catalyst metal oxide; molybdenum

vanadium catalyst ammoxidn propane  
 IT Ammoxidation catalysts  
     (molybdenum tungsten metal oxides, for propane)  
 IT Ammoxidation  
     (of propane)  
 IT 74-98-6, Propane, reactions  
     RL: RCT (Reactant); RACT (Reactant or reagent)  
         (ammoxidn. of, molybdenum vanadium oxide catalysts for)  
 IT 146569-47-3 146569-48-4 146569-49-5 146569-50-8 146569-51-9  
 146569-52-0 146569-53-1 146569-54-2 146569-55-3 146569-56-4  
 146569-57-5 146569-58-6 146569-59-7 146569-60-0 146569-61-1  
 146569-62-2 146569-65-5 146569-66-6 146569-67-7  
 146569-68-8 146569-69-9 146569-70-2  
     RL: CAT (Catalyst use); USES (Uses)  
         (catalyst, for ammoxidn. of propane)  
 IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-95-4, Magnesium,  
     uses 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses  
     7440-02-0, Nickel, uses 7440-03-1, Niobium, uses 7440-05-3, Palladium,  
     uses 7440-25-7, Tantalum, uses 7440-31-5, Tin, uses 7440-32-6,  
     Titanium, uses 7440-33-7, Tungsten, uses 7440-36-0, Antimony, uses  
     7440-39-3, Barium, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt,  
     uses 7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses 7440-69-9,  
     Bismuth, uses 7440-70-2, Calcium, uses 13494-80-9, Tellurium, uses  
     RL: USES (Uses)  
         (catalysts containing mixed metal oxides and, for ammoxidn. of propane)  
 IT 146569-63-3 146569-64-4  
     RL: CAT (Catalyst use); USES (Uses)  
         (catalysts, for ammoxidn. of propane)  
 IT 10102-05-3, Palladium nitrate  
     RL: USES (Uses)  
         (molybdenum vanadium oxide catalyst from, for ammoxidn. of propane)  
 IT 107-13-1P, Acrylonitrile, preparation  
     RL: IMF (Industrial manufacture); PREP (Preparation)  
         (preparation of, by ammoxidn. of propane, molybdenum vanadium oxide catalyst  
         for)

=> => d his 139-

(FILE 'HCAPLUS' ENTERED AT 14:14:53 ON 19 JUL 2005)

FILE 'USPATFULL' ENTERED AT 14:20:33 ON 19 JUL 2005

L39 44 S L26  
 L40 0 S L39 AND B01J037/IPC  
 L41 32 S L39 AND B01J/IPC  
 L42 41 S L39 AND (PD<=20021001 OR PRD<=20021001 OR AD<=20021001)  
 L43 19 S L39 AND (GAFFNEY ? OR SONG ?)/AU  
 L44 3 S L39 AND (ROHM? OR ROEHM?)/PA  
 L45 29 S L41 AND L42  
 L46 31 S L43,L44,L45  
 L47 13 S L39,L42 NOT L46

FILE 'REGISTRY' ENTERED AT 14:23:31 ON 19 JUL 2005

FILE 'HCAPLUS' ENTERED AT 14:25:39 ON 19 JUL 2005

FILE 'USPATFULL' ENTERED AT 14:26:43 ON 19 JUL 2005

L48 29 S L26/P  
 L49 27 S L48 AND L42  
 L50 29 S L48,L49

jan delaval - 19 july 2005

L51 37 S L50,L46  
L52 7 S L39 NOT L51

=> d l51 bib abs hitrn tot

L51 ANSWER 1 OF 37 USPATFULL on STN  
AN 2005:152340 USPATFULL  
TI Catalyst systems for converting alkanes to alkenes and to their  
corresponding oxygenated products  
IN Benderly, Abraham, Elkins Park, PA, UNITED STATES  
Chadda, Nitin, Radnor, PA, UNITED STATES  
Gaffney, Anne Mae, West Chester, PA, UNITED STATES  
Han, Scott, Lawrenceville, NJ, UNITED STATES  
Le, Dominique Hung Nhu, Upper Darby, PA, UNITED STATES  
Silvano, Mark Anthony, New Hope, PA, UNITED STATES  
PI US 2005131255 A1 20050616  
AI US 2004-987367 A1 20041112 (10)  
PRAI US 2003-523297P 20031118 (60)  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399, US  
CLMN Number of Claims: 27  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 2084  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB Alkenes, unsaturated saturated carboxylic acids, saturated carboxylic  
acids and their higher analogues are prepared directly from  
corresponding alkanes utilizing using a mixed bed catalyst at flame  
temperatures in a short contact time reactor.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-42-3P  
(catalyst; preparation of catalyst systems for converting alkanes to alkenes  
and to their corresponding oxygenated products)

L51 ANSWER 2 OF 37 USPATFULL on STN  
AN 2005:124862 USPATFULL  
TI Process for preparing mixed metal oxide catalyst  
IN Gaffney, Anne Mae, West Chester, PA, UNITED STATES  
Martinez, Jose L., Gibsonsia, PA, UNITED STATES  
Song, Ruozhi, Wilmington, DE, UNITED STATES  
PI US 2005107252 A1 20050519  
AI US 2004-978853 A1 20041101 (10)  
PRAI US 2003-520758P 20031117 (60)  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399, US  
CLMN Number of Claims: 13  
ECL Exemplary Claim: 1  
DRWN 3 Drawing Page(s)  
LN.CNT 1005  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The present invention includes a process for preparing an improved  
catalyst having the steps of admixing compounds containing the  
components of the catalyst and at least one solvent to form a precursor;  
extracting the precursor with a supercritical stream to form a processed  
precursor, where the extracting step includes drying the precursor,

atomizing the precursor, and combinations thereof; and calcining the processed precursor to form a catalyst. The process may include drying the precursor by introducing the precursor, which has been previously washed with an alcohol, such as ethanol or methanol, into a vessel and introducing the supercritical stream at a pressure and temperature above the critical point of the stream into the vessel. The process may include drying and atomizing the precursor by introducing the supercritical solvent into the vessel at a pressure and a temperature above critical point of the solvent and introducing the precursor into the extraction vessel through a nozzle. The process may also include drying and atomizing the precursor by introducing the precursor and the supercritical solvent into the vessel through a nozzle.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-42-3

(mixed metal oxide catalyst for vapor phase oxidation and ammoxidn. of alkanes and alkenes to unsatd. carboxylic acids or nitriles)

L51 ANSWER 3 OF 37 USPATFULL on STN

AN 2004:292978 USPATFULL

TI Catalyst for selective oxidation and amoxidation of alkanes and/or alkenes, particularly in processes for obtaining acrylic acid, acrylonitrile and the derivatives thereof

IN Lopez Nieto, Jose Manuel, Valencia, SPAIN

Asuncion, Pablo Botella, Valencia, SPAIN

Solsona Espriu, Benjamin, Valencia, SPAIN

PI US 2004230070 A1 20041118

AI US 2004-759384 A1 20040116 (10)

RLI Continuation of Ser. No. WO 2002-ES357, filed on 16 Jul 2002, UNKNOWN

PRAI ES 2001-1756 20010717 <--

DT Utility

FS APPLICATION

LREP KLAUBER & JACKSON, 4th Fl., 411 Hackensack Avenue, Hackensack, NJ, 07601

CLMN Number of Claims: 14

ECL Exemplary Claim: 1

DRWN 8 Drawing Page(s)

LN.CNT 827

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst for the selective oxidation and amoxidation of alkanes and/or alkenes, particularly in processes for obtaining acrylic acid, acrylonitrile and derivatives of these, including a least one oxide of Mo, Te, V, Cu and at least another A component selected from among Nb, Ta, Sn, Se, W, Ti, Fe, Co, Ni, Cr, Ga, Sb, Bi, a rare, alkaline or alkali-earth earth, in such a way that the catalyst presents, in a calcined form, an X-ray diffractogram with five intensive diffraction lines, typically the most intense corresponding to diffraction angles of  $2\theta$  at  $22.1 \pm 0.4$ ,  $27.1 \pm 0.4$ ,  $28.1 \pm 0.4$ ,  $36.0 \pm 0.4$  and  $45.1 \pm 0.4$ .

In the preferred embodiment, the catalyst has the following empiric formula:

$\text{MoTe.sub.hV.sub.iCu.sub.jA.sub.kO.sub.x}$

in which h, i, j, k are values comprised between 0.001 and 4.0 and x depends on the oxidation status or valency of the Mo, Te, V, Cu and A elements.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 406681-66-1P, Copper molybdenum niobium tellurium vanadium oxide

(mixed metal oxide catalyst for the selective oxidation and ammoxidn. of alkanes and/or alkenes to (meth)acrylic acid or acrylonitrile)

L51 ANSWER 4 OF 37 USPATFULL on STN  
 AN 2004:248363 USPATFULL  
 TI Catalyst composition for the selective conversion of alkanes to unsaturated carboxylic acids, method of making and method of using thereof  
 IN Hazin, Paulette N., Houston, TX, UNITED STATES  
 Ellis, Paul E., JR., Sugar Land, TX, UNITED STATES  
 PA Saudi Basic Industries Corporation (U.S. corporation)  
 PI US 2004192966 A1 20040930  
 AI US 2004-806862 A1 20040323 (10)  
 PRAI US 2003-457117P 20030324 (60)  
 DT Utility  
 FS APPLICATION  
 LREP SABIC AMERICAS, INC., 1600 INDUSTRIAL BLVD., SUGAR LAND, TX, 77478  
 CLMN Number of Claims: 89  
 ECL Exemplary Claim: 1  
 DRWN No Drawings  
 LN.CNT 975  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB A catalyst composition having the formula:

Mo.sub.1V.sub.aSb.sub.bNb.sub.cM.sub.dO.sub.x

wherein M is gallium, bismuth, silver or gold, a is 0.01 to 1, b is 0.01 to 1, c is 0.01 to 1, d is 0.01 to 1 and x is determined by the valence requirements of the other components. Other metals, such as tantalum, titanium, aluminum, zirconium, chromium, manganese, iron, ruthenium, cobalt, rhodium, nickel, platinum, boron, arsenic, lithium, sodium, potassium, rubidium, calcium, beryllium, magnesium, cerium, strontium, hafnium, phosphorus, europium, gadolinium, dysprosium, holmium, erbium, thulium, terbium, ytterbium, lutetium, lanthanum, scandium, palladium, praseodymium, neodymium, yttrium, thorium, tungsten, cesium, zinc, tin, germanium, silicon, lead, barium or thallium may also be components of the catalyst. This catalyst is prepared by co-precipitation of metal compounds which are calcined to form a mixed metal oxide catalyst that can be used for the selective conversion of an alkane to an unsaturated carboxylic acid in a one-step process.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 260557-95-7P, Antimony bismuth molybdenum niobium vanadium oxide  
 261919-86-2P, Antimony gallium molybdenum niobium vanadium oxide  
 511313-29-4P, Antimony gold molybdenum niobium vanadium oxide  
 766557-27-1P  
 (mixed oxide catalysts for selective conversion of alkanes to unsatd. carboxylic acids)

L51 ANSWER 5 OF 37 USPATFULL on STN  
 AN 2004:152517 USPATFULL  
 TI Process for preparing a catalyst and catalytic oxidation therewith  
 IN Lin, Manhua, Maple Glen, PA, UNITED STATES  
 PI US 2004116739 A1 20040617  
 AI US 2003-731512 A1 20031209 (10)  
 RLI Division of Ser. No. US 2001-754942, filed on 4 Jan 2001, GRANTED, Pat. No. US 6693059  
 PRAI US 2000-181412P 20000209 (60) <--  
 DT Utility  
 FS APPLICATION



LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 10  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 570  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB A process useful for the catalytic gas phase oxidation of alkanes to  
unsaturated aldehydes or carboxylic acids uses catalysts of particular  
compositions formed in a particular manner.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 204125-27-9P, Molybdenum niobium tellurium tungsten vanadium oxide  
(catalyst; preparation of alkane oxidation catalyst)

L51 ANSWER 6 OF 37 USPATFULL on STN  
AN 2004:152515 USPATFULL  
TI Nox treated mixed metal oxide catalyst  
IN Gaffney, Anne Mae, West Chester, PA, UNITED STATES  
Heffner, Michele Doreen, Chalfont, PA, UNITED STATES  
Song, Ruozhi, Wilmington, DE, UNITED STATES  
PI US 2004116737 A1 20040617  
AI US 2003-731523 A1 20031209 (10)  
RLI Continuation-in-part of Ser. No. US 2002-116241, filed on 4 Apr 2002,  
PENDING  
PRAI US 2001-283260P 20010412 (60) <--  
DT Utility  
FS APPLICATION

LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 12  
ECL Exemplary Claim: 1  
DRWN 1 Drawing Page(s)  
LN.CNT 1422

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An improved catalyst comprising a mixed metal oxide, either promoted or  
not, is useful for the vapor phase oxidation of an alkane or a mixture  
of an alkane and an alkene to an unsaturated carboxylic acid and for the  
vapor phase ammoxidation of an alkane or a mixture of an alkane and an  
alkene to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-42-3P, Molybdenum niobium palladium tellurium vanadium  
oxide  
(preparation of NOx treated mixed metal oxide catalysts useful for vapor  
oxidation of alkane to unsatd. carboxylic acids)

L51 ANSWER 7 OF 37 USPATFULL on STN  
AN 2004:83534 USPATFULL  
TI Hydrothermally synthesized MO-V-M-NB-X oxide catalysts for the selective  
oxidation of hydrocarbons  
IN Gaffney, Anne Mae, West Chester, PA, UNITED STATES  
Song, Ruozhi, Wilmington, DE, UNITED STATES  
PI US 2004063990 A1 20040401  
AI US 2003-676884 A1 20030930 (10)  
PRAI US 2002-415288P 20021001 (60) <--  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399

CLMN Number of Claims: 11

ECL Exemplary Claim: 1

DRWN 4 Drawing Page(s)

LN.CNT 1700

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Hydrothermally synthesized catalysts comprising a mixed metal oxide are utilized to produce unsaturated carboxylic acids by the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, in the presence thereof; or to produce unsaturated nitrites by the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, and ammonia in the presence thereof.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 146569-65-5P, Cobalt molybdenum niobium tellurium vanadium oxide  
 146569-67-7P, Iron molybdenum niobium tellurium vanadium oxide  
 146569-68-8P, Magnesium molybdenum niobium tellurium vanadium  
 oxide 146569-69-9P, Molybdenum nickel niobium tellurium  
 vanadium oxide 146569-70-2P, Manganese molybdenum niobium  
 tellurium vanadium oxide 149920-42-3P, Molybdenum niobium  
 palladium tellurium vanadium oxide 224324-44-1P, Molybdenum  
 niobium samarium tellurium vanadium oxide 224324-48-5P,  
 Lanthanum molybdenum niobium tellurium vanadium oxide  
 406675-48-7P, Molybdenum niobium tellurium vanadium zinc oxide  
 406675-79-4P, Molybdenum niobium tellurium vanadium bromide oxide  
 406675-80-7P, Molybdenum niobium tellurium vanadium chloride  
 oxide 406675-82-9P, Molybdenum niobium tellurium vanadium  
 iodide oxide 406675-87-4P, Indium molybdenum niobium tellurium  
 vanadium oxide 675571-72-9P, Lead molybdenum niobium tellurium  
 vanadium oxide 676365-84-7P 676365-85-8P  
 676365-86-9P 676365-87-0P 676365-88-1P  
 676365-89-2P

(hydrothermally synthesized Mo-V-M-Nb-X-O oxide catalysts for the  
 selective oxidation of hydrocarbons)

L51 ANSWER 8 OF 37 USPATFULL on STN

AN 2004:82420 USPATFULL

TI Heterogeneously catalyzed gas-phase partial oxidation of acrolein to  
 acrylic acid

IN Dieterle, Martin, Mannheim, GERMANY, FEDERAL REPUBLIC OF  
 Borgmeier, Frieder, Mannheim, GERMANY, FEDERAL REPUBLIC OF  
 Mueller-Engel, Klaus Joachim, Stutensee, GERMANY, FEDERAL REPUBLIC OF  
 Hibst, Hartmut, Schriesheim, GERMANY, FEDERAL REPUBLIC OF

PA BASF Aktiengesellschaft, Ludwigshafen, GERMANY, FEDERAL REPUBLIC OF  
 (non-U.S. corporation)

PI US 2004062870 A1 20040401

AI US 2003-667786 A1 20030923 (10)

PRAI DE 2002-10261186 20021220

DE 2002-10245585 20020927

<--

DE 2002-10246119 20021001

<--

DE 2002-10248584 20021017

DE 2002-10254278 20021120

DE 2002-10254279 20021120

DT Utility

FS APPLICATION

LREP OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C., 1940 DUKE STREET,  
 ALEXANDRIA, VA, 22314

CLMN Number of Claims: 27

ECL Exemplary Claim: 1

DRWN 17 Drawing Page(s)

LN.CNT 1221

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process for the heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid over a multimetal oxide material having a specific structure, which contains the elements Mo and V, at least one of the elements Te and Sb and at least one of the elements from the group consisting of Nb, Ta, W and Ti and is doped with promoter elements, is described.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 146569-65-5P 146569-69-9P 149920-40-1P  
149920-42-3P 675571-72-9P

(heterogeneously catalyzed gas-phase partial oxidation of acrolein to acrylic acid)

L51 ANSWER 9 OF 37 USPATFULL on STN

AN 2004:70993 USPATFULL

TI Alkane oxidation catalyst, process for producing the same, and process for producing oxygen-containing unsaturated compound

IN Kobayashi, Tomoaki, Yamaguchi, JAPAN  
Seo, Yoshimasa, Gunma, JAPAN

PI US 2004054221 A1 20040318

AI US 2003-450373 A1 20030610 (10)

WO 2001-JP11180 20011220

<--

PRAI JP 2000-391078 20001222

<--

JP 2001-94513 20010329

<--

JP 2001-108122 20010406

<--

DT Utility

FS APPLICATION

LREP Kevin S Lemack, Niels & Lemack, Suite 8, 176 East Main Street,  
Westboro, MA, 01581

CLMN Number of Claims: 11

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 671

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An object of the present invention is to provide a highly active catalyst for producing an unsaturated oxygen-containing compound from an alkane and the catalyst comprising Mo, V, Ti and Sb or Te as the indispensable active components. The preferable catalyst is represented by formula (1) or (2) as shown below,

Mo.sub.1.0V.sub.aTi.sub.bX.sub.cY.sub.dO.sub.e (1)

Mo.sub.1.0V.sub.aTi.sub.bX.sub.cY.sub.dZ.sub.fO.sub.e (2)

wherein X represents Sb or Te; Y represents Nb, W or Zr; Z represents Li, Na, K, Rb, Cs, Mg, Ca or Sr; a, b, c, d, e and f represent atomic ratios of their respective elements, with  $0 < a < 0.7$ ,  $0 < b < 0.3$ ,  $0 < c < 0.7$ ,  $0 \leq d < 0.3$ ,  $0 < f < 0.1$ ; e is a number determined by oxidation states of the other elements than oxygen.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 380413-67-2P 380413-74-1P

(high-activity oxidation catalysts for propane for preparation of acrylic acid)

L51 ANSWER 10 OF 37 USPATFULL on STN

AN 2004:39184 USPATFULL

TI Annealed and promoted catalyst

IN Gaffney, Anne Mae, West Chester, PA, UNITED STATES

Heffner, Michele Doreen, Chalfont, PA, UNITED STATES

**Song, Ruozhi**, Wilmington, DE, UNITED STATES

PI US 2004029725 A1 20040212  
AI US 2003-636113 A1 20030807 (10)  
RLI Division of Ser. No. US 2002-117904, filed on 8 Apr 2002, GRANTED, Pat.  
No. US 6645905  
PRAI US 2001-286278P 20010425 (60) <--  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 12  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1401

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A mixed metal oxide, which may be an orthorhombic phase material, is improved as a catalyst for the production of unsaturated carboxylic acids, or unsaturated nitrites, from alkanes, or mixtures of alkanes and alkenes, by: contacting with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture; recovering insoluble material from the contact mixture; calcining the recovered insoluble material in a non-oxidizing atmosphere; admixing the calcined recovered insoluble material with (i) at least one promoter element or compound thereof and (iii) at least one solvent for the at least one promoter element or compound thereof; removing the at least one solvent to form a catalyst precursor; and calcining the catalyst precursor.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT **224324-44-1P**, Molybdenum niobium samarium tellurium vanadium oxide (annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

L51 ANSWER 11 OF 37 USPATFULL on STN

AN 2003:289349 USPATFULL  
TI Ir and/or Sm promoted multi-metal oxide catalyst  
IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
**Gaffney, Anne Mae**, West Chester, PA, UNITED STATES  
Han, Scott, Lawrenceville, NJ, UNITED STATES  
Heffner, Michele Doreen, Chalfont, PA, UNITED STATES  
**Song, Ruozhi**, Wilmington, DE, UNITED STATES

PI US 2003204111 A1 20031030  
US 6790988 B2 20040914  
AI US 2003-430599 A1 20030507 (10)  
RLI Division of Ser. No. US 2001-927288, filed on 10 Aug 2001, PENDING  
PRAI US 2000-235980P 20000928 (60) <--  
US 2000-235981P 20000928 (60) <--  
US 2000-236143P 20000929 (60) <--  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 10  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1170

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an

alkene to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 224324-44-1P, Molybdenum niobium samarium tellurium vanadium oxide  
406675-66-9P  
(iridium and/or samarium promoted multi-metal oxide oxidation and ammoxidn. catalysts)

L51 ANSWER 12 OF 37 USPATFULL on STN  
AN 2003:271728 USPATFULL  
TI Zn and/or Ga promoted multi-metal oxide catalyst  
IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
Gaffney, Anne Mae, West Chester, PA, UNITED STATES  
Han, Scott, Lawrenceville, NJ, UNITED STATES  
Nhu Le, Dominique Hung, Upper Darby, PA, UNITED STATES  
PI US 2003191336 A1 20031009  
US 6700015 B2 20040302  
AI US 2003-430194 A1 20030506 (10)  
RLI Division of Ser. No. US 2001-928019, filed on 10 Aug 2001, GRANTED, Pat.  
No. US 6589907  
PRAI US 2000-235978P 20000928 (60) <--  
US 2000-236129P 20000928 (60) <--  
US 2000-236260P 20000928 (60) <--  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 10  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1378

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 406675-48-7P 406675-50-1P  
(zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn. catalyst)

L51 ANSWER 13 OF 37 USPATFULL on STN  
AN 2003:251945 USPATFULL  
TI Halogen promoted multi-metal oxide catalyst  
IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
Gaffney, Anne Mae, West Chester, PA, UNITED STATES  
Han, Scott, Lawrenceville, NJ, UNITED STATES  
Heffner, Michele Doreen, Chalfont, PA, UNITED STATES  
Song, Ruozhi, Wilmington, DE, UNITED STATES  
PI US 2003176734 A1 20030918  
US 6747168 B2 20040608  
AI US 2003-444599 A1 20030522 (10)  
RLI Division of Ser. No. US 2002-225709, filed on 22 Aug 2002, PENDING  
Division of Ser. No. US 2001-927941, filed on 10 Aug 2001, GRANTED, Pat.  
No. US 6461996  
PRAI US 2000-235977P 20000928 (60) <--

US 2000-236261P 20000928 (60) <--  
US 2000-236262P 20000928 (60) <--  
US 2000-236263P 20000928 (60) <--  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 14  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1270  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB A catalyst comprising a promoted mixed metal oxide is useful for the  
vapor phase oxidation of an alkane or a mixture of an alkane and an  
alkene to an unsaturated carboxylic acid and for the vapor phase  
ammoxidation of an alkane or a mixture of an alkane and an alkene to an  
unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 406675-79-4P 406675-80-7P 406675-81-8P  
406675-82-9P

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

L51 ANSWER 14 OF 37 USPATFULL on STN

AN 2003:181746 USPATFULL

TI Process for producing acrylic acid

IN Yunoki, Hiromi, Himeji-shi, JAPAN

PI US 2003125580 A1 20030703

AI US 2002-228089 A1 20020827 (10) <--

PRAI JP 2001-285033 20010919 <--

DT Utility

FS APPLICATION

LREP ROYLANCE, ABRAMS, BERDO & GOODMAN, L.L.P., 1300 19TH STREET, N.W., SUITE  
600, WASHINGTON,, DC, 20036

CLMN Number of Claims: 4

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 626

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention provides a process for producing acrylic acid, by  
which process the problem, such that the catalyst placed on the gas  
inlet side deteriorates faster than that placed on the gas outlet side,  
is solved, so that the catalyst can be used stably for a long time. The  
process for producing acrylic acid, according to the present invention,  
comprises the step of carrying out catalytic gas phase oxidation with a  
fixed-bed shell-and-tube reactor as packed with a catalyst, wherein:  
used as the catalyst is an oxide shown by the following general formula  
(1):  $MO.sub.aV.sub.bA.sub.cB.sub.dC.sub.eO.sub.f$  (1) (wherein: A shows  
at least one member selected from the group consisting of niobium and  
tungsten; B shows at least one member selected from the group consisting  
of chromium, manganese, iron, cobalt, nickel, copper, zinc, and bismuth;  
C shows at least one member selected from the group consisting of  
phosphorus, tin, antimony, and tellurium); and at least two reaction  
zones as provided by dividing the inside of each reaction tube in a  
direction of an axis of the tube in the reactor are packed with the  
catalyst such that there are regulated the kind and/or amount of the A  
component and/or the kind and/or amount of the B component.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 292139-85-6P, Antimony copper molybdenum niobium vanadium oxide

(process for producing acrylic acid)

L51 ANSWER 15 OF 37 USPATFULL on STN  
 AN 2003:127903 USPATFULL  
 TI Catalyst for use in catalytic oxidation or ammoxidation of propane or isobutane in the gaseous phase  
 IN Komada, Satoru, Yokosuka-shi, JAPAN  
 Hinago, Hidenori, Kurashiki-shi, JAPAN  
 Nagano, Osamu, Yokohama-shi, JAPAN  
 Watanabe, Mamoru, Okayama-ken, JAPAN  
 PI US 2003088118 A1 20030508  
 AI US 2002-231113 A1 20020830 (10) <--  
 RLI Continuation-in-part of Ser. No. WO 2001-JP5055, filed on 14 Jun 2001, UNKNOWN  
 PRAI JP 2000-179687 20000615 <--  
 DT Utility  
 FS APPLICATION  
 LREP BIRCH STEWART KOLASCH & BIRCH, PO BOX 747, FALLS CHURCH, VA, 22040-0747  
 CLMN Number of Claims: 12  
 ECL Exemplary Claim: 1  
 DRWN No Drawings  
 LN.CNT 2339

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed is an oxide catalyst comprising an oxide represented by the formula  $\text{Mo.sub.1V.sub.aNb.sub.bX.sub.cY.sub.dZ.sub.eQ.sub.fO.sub.n}$  (wherein: X is at least one element selected from the group consisting of Te and Sb; Y is at least one element selected from the group consisting of Al and W; Z is at least one element selected from the group consisting of elements which individually form an oxide having a rutile structure and a Z oxide having a rutile structure is used as a source of Z for producing the catalyst; Q is at least one element selected from the group consisting of titanium, tin, germanium, lead, tantalum, ruthenium, rhenium, rhodium, iridium, platinum, chromium, manganese, technetium, osmium, iron, arsenic, cerium, cobalt, magnesium, nickel and zinc, and a Q compound not having a rutile structure is used as a source of Q for producing the catalyst; and a, b, c, d, e, f and n are, respectively, the atomic ratios of V, Nb, X, Y, Z, Q and O, relative to Mo). Also disclosed is a process for producing an unsaturated carboxylic acid or an unsaturated nitrile by using the above-mentioned oxide catalyst.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 198018-04-1P 380413-67-2P 380413-74-1P  
 (catalysts for vapor-phase catalytic oxidation and vapor-phase catalytic ammoxidn. of propane and isobutane)

L51 ANSWER 16 OF 37 USPATFULL on STN  
 AN 2003:24364 USPATFULL  
 TI Halogen promoted multi-metal oxide catalyst  
 IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
 Gaffney, Anne Mae, West Chester, PA, UNITED STATES  
 Han, Scott, Lawrenceville, NJ, UNITED STATES  
 Hefener, Michele Doreen, Chalfont, PA, UNITED STATES  
 Song, Ruozhi, Wilmington, DE, UNITED STATES  
 PI US 2003018208 A1 20030123  
 US 6624111 B2 20030923  
 AI US 2002-225709 A1 20020822 (10) <--  
 RLI Division of Ser. No. US 2001-927941, filed on 10 Aug 2001, GRANTED, Pat. No. US 6461996  
 PRAI US 2000-235977P 20000928 (60) <--

US 2000-236261P 20000928 (60) <--  
US 2000-236262P 20000928 (60) <--  
US 2000-236263P 20000928 (60) <--  
DT Utility  
FS APPLICATION  
LREP Alan Holler, Rohm and Haas Company - Patent Department, 100 Independence  
Mall West, Philadelphia, PA, 19106-2399  
CLMN Number of Claims: 14  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1272

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the  
vapor phase oxidation of an alkane or a mixture of an alkane and an  
alkene to an unsaturated carboxylic acid and for the vapor phase  
ammoxidation of an alkane or a mixture of an alkane and an alkene to an  
unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 406675-79-4P 406675-80-7P 406675-81-8P  
406675-82-9P

(halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

L51 ANSWER 17 OF 37 USPATFULL on STN

AN 2003:6995 USPATFULL

TI Promoted multi-metal oxide catalyst

IN Chaturvedi, Sanjay, Horsham, PA, United States

Gaffney, Anne Mae, West Chester, PA, United States

Han, Scott, Lawrenceville, NJ, United States

Heffner, Michele Doreen, Chalfont, PA, United States

Song, Ruozhi, Wilmington, DE, United States

Le, Dominique Hung Nhu, Upper Darby, PA, United States

Vickery, Elsie Mae, Jenkintown, PA, United States

PA Rohm and Haas Company, Philadelphia, PA, United States (U.S.  
corporation)

PI US 6504053 B1 20030107

AI US 2002-144924 20020514 (10) <--

RLI Division of Ser. No. US 2001-928197, filed on 10 Aug 2001, now patented,  
Pat. No. US 6407280

PRAI US 2001-286219P 20010425 (60) <--

US 2000-236130P 20000928 (60) <--

US 2000-235979P 20000928 (60) <--

US 2000-236000P 20000928 (60) <--

US 2000-235984P 20000928 (60) <--

DT Utility

FS GRANTED

EXNAM Primary Examiner: McKane, Joseph K.; Assistant Examiner: Saeed, Kamal

LREP Holler, Alan

CLMN Number of Claims: 2

ECL Exemplary Claim: 1

DRWN 0 Drawing Figure(s); 0 Drawing Page(s)

LN.CNT 1489

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the  
vapor phase oxidation of an alkane or a mixture of an alkane and an  
alkene to an unsaturated carboxylic acid and for the vapor phase  
ammoxidation of an alkane or a mixture of an alkane and an alkene to an  
unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.



IT 146569-69-9P, Molybdenum nickel niobium tellurium vanadium oxide  
149920-42-3P, Molybdenum niobium palladium tellurium vanadium  
oxide 406681-66-1P 406681-67-2P 406681-68-3P  
(promoted multi-metal oxide oxidation or ammoxidn. catalysts for  
preparation of  
carboxylic acids or nitriles from alkanes and/or alkenes)

L51 ANSWER 18 OF 37 USPATFULL on STN

AN 2002:323032 USPATFULL

TI Annealed and promoted catalyst

IN Gaffney, Anne Mae, West Chester, PA, UNITED STATES

Heffner, Michele Doreen, Chalfont, PA, UNITED STATES

Song, Ruozhi, Wilmington, DE, UNITED STATES

PI US 2002183198 A1 20021205

US 6645905 B2 20031111

AI US 2002-117904 A1 20020408 (10) <--

PRAI US 2001-286278P 20010425 (60) <--

DT Utility

FS APPLICATION

LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399

CLMN Number of Claims: 12

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 1401

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A mixed metal oxide, which may be an orthorhombic phase material, is improved as a catalyst for the production of unsaturated carboxylic acids, or unsaturated nitrites, from alkanes, or mixtures of alkanes and alkenes, by: contacting with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture; recovering insoluble material from the contact mixture; calcining the recovered insoluble material in a non-oxidizing atmosphere; admixing the calcined recovered insoluble material with (i) at least one promoter element or compound thereof and (ii) at least one solvent for the at least one promoter element or compound thereof; removing the at least one solvent to form a catalyst precursor; and calcining the catalyst precursor.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 224324-44-1P, Molybdenum niobium samarium tellurium vanadium oxide  
(annealed and promoted catalyst for production of unsatd. carboxylic acids and nitriles)

L51 ANSWER 19 OF 37 USPATFULL on STN

AN 2002:310893 USPATFULL

TI Process for making highly active and selective catalysts for the  
production of unsaturated nitriles

IN Abdulwahed, Mazhar, Damascus, SYRIAN ARAB REPUBLIC

El-Yahyaoui, Khalid, Meknes, MOROCCO

PA Saudi Basic Industries Corporation, Riyadh, SAUDI ARABIA (non-U.S.  
corporation)

PI US 6486091 B1 20021126

AI US 2000-675599 20000929 (9) <--

PRAI US 2000-189215P 20000314 (60) <--

DT Utility

FS GRANTED

EXNAM Primary Examiner: Silverman, Stanley S.; Assistant Examiner: Ildebrando,  
Christina

LREP Kramer Levin Naftalis & Frankel LLP

CLMN Number of Claims: 40  
ECL Exemplary Claim: 1  
DRWN 0 Drawing Figure(s); 0 Drawing Page(s)  
LN.CNT 565

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An improved catalyst for the production of unsaturated nitrites from their corresponding olefins, the catalyst having the atomic ratios described by the empirical formula  $\text{Bi.sub.aMo.sub.bV.sub.cSb.sub.dNb.sub.eA.sub.fB.sub.gO.sub.x}$  and methods of making and using the same.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 260557-95-7  
(highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)

L51 ANSWER 20 OF 37 USPATFULL on STN

AN 2002:283390 USPATFULL

TI Promoted multi-metal oxide catalyst

IN Bogan, Jr., Leonard Edward, Hatfield, PA, United States

PA Rohm and Haas Company, Philadelphia, PA, United States (U.S. corporation)

PI US 6472552 B1 20021029

AI US 2002-96018 20020312 (10) <--

RLI Division of Ser. No. US 2001-928022, filed on 9 Aug 2001, now patented, Pat. No. US 6383978

PRAI US 2001-286222P 20010425 (60) <--

US 2001-286218P 20010425 (60) <--

DT Utility

FS GRANTED

EXNAM Primary Examiner: Lambkin, Deborah C.; Assistant Examiner: Saeed, Kamal

LREP Holler, Alan

CLMN Number of Claims: 4

ECL Exemplary Claim: 1

DRWN 0 Drawing Figure(s); 0 Drawing Page(s)

LN.CNT 902

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A promoted multi-metal oxide catalyst is useful for the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane, or a mixture of an alkane and an alkene, to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-40-1, Bismuth molybdenum niobium tellurium vanadium oxide  
420134-66-3

(promoted mixed metal oxide catalyst for alkane oxidation to unsatd. nitrile)

L51 ANSWER 21 OF 37 USPATFULL on STN

AN 2002:259631 USPATFULL

TI Promoted multi-metal oxide catalyst

IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES

Gaffney, Anne Mae, West Chester, PA, UNITED STATES

Han, Scott, Lawrenceville, NJ, UNITED STATES

Heffner, Michele Doreen, Chalfont, PA, UNITED STATES

Song, Ruozhi, Wilmington, DE, UNITED STATES

PI US 2002143208 A1 20021003

US 6825380 B2 20041130

AI US 2002-95612 A1 20020312 (10) <--

RLI Division of Ser. No. US 2001-928030, filed on 11 Aug 2001, PENDING

PRAI US 2000-235982P 20000928 (60) <--  
US 2000-236073P 20000928 (60) <--  
US 2000-236305P 20000928 (60) <--  
US 2000-236250P 20000928 (60) <--  
US 2000-235983P 20000928 (60) <--  
DT Utility  
FS APPLICATION  
LREP Alan Holler, Rohm and Haas Company - Patent Department, 100 Independence  
Mall West, Philadelphia, PA, 19106-2399  
CLMN Number of Claims: 10  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1341

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 224324-37-2P, Molybdenum neodymium niobium tellurium vanadium oxide 224324-51-0P, Molybdenum niobium praseodymium tellurium vanadium oxide 224324-60-1P, Molybdenum niobium tellurium terbium vanadium oxide 224324-73-6P, Molybdenum niobium scandium tellurium vanadium oxide 406675-58-9P  
(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of alkanes and/or alkenes to carboxylic acids or nitriles)

L51 ANSWER 22 OF 37 USPATFULL on STN

AN 2002:243850 USPATFULL

TI Promoted multi-metal oxide catalyst

IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES

Gaffney, Anne Mae, West Chester, PA, UNITED STATES

Han, Scott, Lawrenceville, NJ, UNITED STATES

Vickery, Elsie Mae, Jenkintown, PA, UNITED STATES

PI US 2002133044 A1 20020919 <--

US 6797840 B2 20040928

AI US 2002-95633 A1 20020312 (10) <--

RLI Division of Ser. No. US 2001-928020, filed on 10 Aug 2001, PENDING

PRAI US 2000-236112P 20000928 (60) <--

US 2001-283245P 20010412 (60) <--

DT Utility

FS APPLICATION

LREP Alan Holler, Rohm and Haas Company - Patent Department, 100 Independence

Mall West, Philadelphia, PA, 19106-2399

CLMN Number of Claims: 10

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 1218

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising an In promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane, or a mixture of an alkane and an alkene, to an unsaturated nitrile

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 406675-87-4P 406675-88-5P

(promoted multi-metal oxide oxidation catalyst)

L51 ANSWER 23 OF 37 USPATFULL on STN  
 AN 2002:141641 USPATFULL  
 TI Zn and/or Ga promoted multi-metal oxide catalyst  
 IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
     **Gaffney, Anne Mae**, West Chester, PA, UNITED STATES  
     Han, Scott, Lawrenceville, NJ, UNITED STATES  
     Le, Dominique Hung Nhu, Upper Darby, PA, UNITED STATES  
 PI US 2002072629 A1 20020613 <--  
     US 6589907 B2 20030708  
 AI US 2001-928019 A1 20010810 (9) <--  
 PRAI US 2000-235978P 20000928 (60) <--  
     US 2000-236129P 20000928 (60) <--  
     US 2000-236260P 20000928 (60) <--  
 DT Utility  
 FS APPLICATION  
 LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
     PHILADELPHIA, PA, 19106-2399  
 CLMN Number of Claims: 10  
 ECL Exemplary Claim: 1  
 DRWN No Drawings  
 LN.CNT 1437  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB A catalyst comprising a promoted mixed metal oxide is useful for the  
     vapor phase oxidation of an alkane or a mixture of an alkane and an  
     alkene to an unsaturated carboxylic acid and for the vapor phase  
     ammoxidation of an alkane or a mixture of an alkane and an alkene to an  
     unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 IT 406675-48-7P 406675-50-1P  
     (zinc and/or gallium promoted multi-metal oxide oxidation and ammoxidn.  
     catalyst)

L51 ANSWER 24 OF 37 USPATFULL on STN  
 AN 2002:126913 USPATFULL  
 TI Promoted multi-metal oxide catalyst  
 IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
     **Gaffney, Anne Mae**, West Chester, PA, UNITED STATES  
     Han, Scott, Lawrenceville, NJ, UNITED STATES  
     Heffner, Michele Doreen, Chalfont, PA, UNITED STATES  
     **Song, Ruozhi**, Wilmington, DE, UNITED STATES  
     Nhu Le, Dominique Hung, Upper Darby, PA, UNITED STATES  
     Vickery, Elsie Mae, Jenkintown, PA, UNITED STATES  
 PI US 2002065431 A1 20020530 <--  
     US 6407280 B2 20020618  
 AI US 2001-928197 A1 20010810 (9) <--  
 PRAI US 2000-236130P 20000928 (60) <--  
     US 2000-235979P 20000928 (60) <--  
     US 2000-236000P 20000928 (60) <--  
     US 2000-235984P 20000928 (60) <--  
     US 2001-286219P 20010425 (60) <--  
 DT Utility  
 FS APPLICATION  
 LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
     PHILADELPHIA, PA, 19106-2399  
 CLMN Number of Claims: 10  
 ECL Exemplary Claim: 1  
 DRWN No Drawings  
 LN.CNT 1579

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 146569-69-9P, Molybdenum nickel niobium tellurium vanadium oxide  
149920-42-3P, Molybdenum niobium palladium tellurium vanadium  
oxide 406681-66-1P 406681-67-2P 406681-68-3P  
(promoted multi-metal oxide oxidation or ammoxidn. catalysts for  
preparation of  
carboxylic acids or nitriles from alkanes and/or alkenes)

L51 ANSWER 25 OF 37 USPATFULL on STN

AN 2002:120053 USPATFULL

TI PROMOTED MULTI-METAL OXIDE CATALYST

IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES

Gaffney, Anne Mae, West Chester, PA, UNITED STATES

Han, Scott, Lawrenceville, NJ, UNITED STATES

Heffner, Michele Doreen, Chalfont, PA, UNITED STATES

Song, Ruozhi, Wilmington, DE, UNITED STATES

PI US 2002062042 A1 20020523 <--

US 6407031 B2 20020618

AI US 2001-928030 A1 20010811 (9) <--

PRAI US 2000-235982P 20000928 (60) <--

US 2000-236073P 20000928 (60) <--

US 2000-236305P 20000928 (60) <--

US 2000-236250P 20000928 (60) <--

US 2000-235983P 20000928 (60) <--

DT Utility

FS APPLICATION

LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399

CLMN Number of Claims: 10

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 1342

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 224324-37-2P, Molybdenum neodymium niobium tellurium vanadium

oxide 224324-51-0P, Molybdenum niobium praseodymium tellurium

vanadium oxide 224324-60-1P, Molybdenum niobium tellurium

terbium vanadium oxide 224324-73-6P, Molybdenum niobium

scandium tellurium vanadium oxide 406675-58-9P

(promoted multi-metal oxide catalysts for oxidation or ammoxidn. of  
alkanes and/or alkenes to carboxylic acids or nitriles)

L51 ANSWER 26 OF 37 USPATFULL on STN

AN 2002:120049 USPATFULL

TI Ir and/or Sm promoted multi-metal oxide catalyst

IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES

Gaffney, Anne Mae, West Chester, PA, UNITED STATES

Han, Scott, Lawrenceville, NJ, UNITED STATES  
Heffner, Michele Doreen, Chalfont, PA, UNITED STATES  
**Song, Ruozhi**, Wilmington, DE, UNITED STATES

PI US 2002062038 A1 20020523 <--  
US 6734136 B2 20040511  
AI US 2001-927288 A1 20010810 (9) <--  
PRAI US 2000-235980P 20000928 (60) <--  
US 2000-235981P 20000928 (60) <--  
US 2000-236143P 20000929 (60) <--  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 10  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1170

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising a promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane or a mixture of an alkane and an alkene to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT **224324-44-1P**, Molybdenum niobium samarium tellurium vanadium oxide  
**406675-66-9P**  
(iridium and/or samarium promoted multi-metal oxide oxidation and ammoxidn. catalysts)

L51 ANSWER 27 OF 37 USPATFULL on STN  
AN 2002:113088 USPATFULL  
TI PROMOTED MULTI-METAL OXIDE CATALYST  
IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
**Gaffney, Anne Mae**, West Chester, PA, UNITED STATES  
Han, Scott, Lawrenceville, NJ, UNITED STATES  
Vickery, Elsie Mae, Jenkintown, PA, UNITED STATES

PI US 2002058836 A1 20020516 <--  
US 6403525 B2 20020611  
AI US 2001-928020 A1 20010810 (9) <--  
PRAI US 2000-236112P 20000928 (60) <--  
US 2001-283245P 20010412 (60) <--  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 10  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 1223

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst comprising an In promoted mixed metal oxide is useful for the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, to an unsaturated carboxylic acid and for the vapor phase ammoxidation of an alkane, or a mixture of an alkane and an alkene, to an unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT **406675-87-4P 406675-88-5P**  
(promoted multi-metal oxide oxidation catalyst)

L51 ANSWER 28 OF 37 USPATFULL on STN  
 AN 2002:113087 USPATFULL  
 TI Halogen promoted multi-metal oxide catalyst  
 IN Chaturvedi, Sanjay, Horsham, PA, UNITED STATES  
     **Gaffney, Anne Mae**, West Chester, PA, UNITED STATES  
     Han, Scott, Lawrenceville, NJ, UNITED STATES  
     Heffner, Michele Doreen, Chalfont, PA, UNITED STATES  
     **Song, Ruozhi**, Wilmington, DE, UNITED STATES  
 PI US 2002058835 A1 20020516 <--  
     US 6461996 B2 20021008  
 AI US 2001-927941 A1 20010810 (9) <--  
 PRAI US 2000-236261P 20000928 (60) <--  
     US 2000-235977P 20000928 (60) <--  
     US 2000-236263P 20000928 (60) <--  
     US 2000-236262P 20000928 (60) <--  
 DT Utility  
 FS APPLICATION  
 LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
     PHILADELPHIA, PA, 19106-2399  
 CLMN Number of Claims: 14  
 ECL Exemplary Claim: 1  
 DRWN No Drawings  
 LN.CNT 1270  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB A catalyst comprising a promoted mixed metal oxide is useful for the  
     vapor phase oxidation of an alkane or a mixture of an alkane and an  
     alkene to an unsaturated carboxylic acid and for the vapor phase  
     ammoxidation of an alkane or a mixture of an alkane and an alkene to an  
     unsaturated nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 IT 406675-79-4P 406675-80-7P 406675-81-8P  
     406675-82-9P  
     (halogen promoted multi-metal oxide oxidation and ammoxidn. catalysts)

L51 ANSWER 29 OF 37 USPATFULL on STN  
 AN 2002:102444 USPATFULL  
 TI Promoted multi-metal oxide catalyst  
 IN Bogan, Jr., Leonard Edward, Hatfield, PA, United States  
 PA **Rohm and Haas Company**, Philadelphia, PA, United States (U.S.  
     corporation)  
 PI US 6383978 B1 20020507 <--  
 AI US 2001-928022 20010809 (9) <--  
 PRAI US 2001-286222P 20010425 (60) <--  
     US 2001-286218P 20010425 (60) <--  
 DT Utility  
 FS GRANTED  
 EXNAM Primary Examiner: Higel, Floyd D.; Assistant Examiner: Saeed, Kamal  
 LREP Holler, Alan  
 CLMN Number of Claims: 6  
 ECL Exemplary Claim: 1  
 DRWN 0 Drawing Figure(s); 0 Drawing Page(s)  
 LN.CNT 868  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB A promoted multi-metal oxide catalyst is useful for the vapor phase  
     oxidation of an alkane, or a mixture of an alkane and an alkene, to an  
     unsaturated carboxylic acid and for the vapor phase ammoxidation of an  
     alkane, or a mixture of an alkane and an alkene, to an unsaturated  
     nitrile.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-40-1, Bismuth molybdenum niobium tellurium vanadium oxide  
420134-66-3  
(promoted mixed metal oxide catalyst for alkane oxidation to unsatd.  
nitrile)

L51 ANSWER 30 OF 37 USPATFULL on STN

AN 2002:17484 USPATFULL  
TI Process for preparing a catalyst and catalytic oxidation therewith  
IN Lin, Manhwa, Maple Glen, PA, UNITED STATES  
PI US 2002010365 A1 20020124 <--  
US 6693059 B2 20040217  
AI US 2001-754942 A1 20010104 (9) <--  
PRAI US 2000-181412P 20000209 (60) <--  
DT Utility  
FS APPLICATION  
LREP Alan Holler, Rohm and Haas Company, 100 Independence Mall West,  
Philadelphia, PA, 19106-2399  
CLMN Number of Claims: 10  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 571

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process useful for the catalytic gas phase oxidation of alkanes to  
unsaturated aldehydes or carboxylic acids uses catalysts of particular  
compositions formed in a particular manner.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 204125-27-9P, Molybdenum niobium tellurium tungsten vanadium oxide  
(catalyst; preparation of alkane oxidation catalyst)

L51 ANSWER 31 OF 37 USPATFULL on STN

AN 2000:128267 USPATFULL  
TI Highly active and selective catalysts for the production of unsaturated  
nitriles, methods of making and using the same  
IN Abdulwahed, Mazhar, Damascus, Syria  
El Yahyaoui, Khalid, Meknes, Morocco  
PA Saudi Basic Industries Corporation, Saudi Arabia (non-U.S. corporation)  
PI US 6124233 20000926 <--  
AI US 1999-431744 19991101 (9) <--  
RLI Division of Ser. No. US 1999-228885, filed on 11 Jan 1999  
DT Utility  
FS Granted  
EXNAM Primary Examiner: McKane, Joseph; Assistant Examiner: Murray, Joseph  
LREP Whitman Breed Abbott & Morgan LLP  
CLMN Number of Claims: 21  
ECL Exemplary Claim: 1  
DRWN 1 Drawing Figure(s); 1 Drawing Page(s)  
LN.CNT 339

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An improved catalyst for the production of unsaturated nitriles from  
their corresponding olefins, the catalyst having the atomic ratios  
described by the empirical formula  $B_i \cdot \text{sub.a} \text{ Mo} \cdot \text{sub.b} \text{ V} \cdot \text{sub.c} \text{ Sb} \cdot \text{sub.d}$   
 $\text{Nb} \cdot \text{sub.e} \text{ A} \cdot \text{sub.f} \text{ B} \cdot \text{sub.g} \text{ O} \cdot \text{sub.x}$  and methods of using the same.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 260557-95-7  
(highly active and selective catalysts for the production of unsatd.  
nitriles, methods of making and using the same)



L51 ANSWER 32 OF 37 USPATFULL on STN  
 AN 2000:57716 USPATFULL  
 TI Process for producing acrylic acid  
 IN Takahashi, Mamoru, Aichi, Japan  
 Tu, Xinlin, Aichi, Japan  
 Hirose, Toshiro, Aichi, Japan  
 Ishii, Masakazu, Aichi, Japan  
 PA Toagosei Co., Ltd., Tokyo, Japan (non-U.S. corporation)  
 PI US 6060422 20000509 <--  
 AI US 1999-339230 19990624 (9) <--  
 RLI Division of Ser. No. US 1997-955246, filed on 21 Oct 1997, now patented,  
 Pat. No. US 5994580, issued on 30 Nov 1999  
 PRAI JP 1996-297755 19961021 <--  
 JP 1997-54200 19970221 <--  
 DT Utility  
 FS Granted  
 EXNAM Primary Examiner: Dunn, Tom; Assistant Examiner: Nguyen, Cam N.  
 LREP Sughrue, Mion, Zinn, Macpeak & Seas, PLLC  
 CLMN Number of Claims: 3  
 ECL Exemplary Claim: 1  
 DRWN No Drawings  
 LN.CNT 720

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process for producing acrylic acid from propane and oxygen gas through a vapor-phase catalytic oxidation reaction, said process comprising conducting the reaction using as a catalyst a metal oxide containing metallic elements Mo, V, Sb, and A (provided that A is at least one element selected from the group consisting of Nb, Ta, Sn, W, Ti, Ni, Fe, Cr, and Co). The metal oxide is prepared by a process including specific steps (1) and (2). The metal oxide may be supported on a compound containing specific elements.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 207615-99-4P 207616-00-0P 207616-02-2P  
 (preparation of acrylic acid from propane using mixed metal oxide catalysts)

L51 ANSWER 33 OF 37 USPATFULL on STN  
 AN 2000:37742 USPATFULL  
 TI Ammoxidation catalyst for use in producing acrylonitrile or methacrylonitrile from propane or isobutane by ammoxidation  
 IN Komada, Satoru, Yokohama, Japan  
 Hamada, Kazuyuki, Kurashiki, Japan  
 PA Asahi Kasei Kogyo Kabushiki Kaisha, Osaka, Japan (non-U.S. corporation)  
 PI US 6043186 20000328 <--  
 AI US 1998-172648 19981015 (9) <--  
 PRAI JP 1997-282304 19971015 <--  
 DT Utility  
 FS Granted  
 EXNAM Primary Examiner: Niebling, John F.; Assistant Examiner: Ghyka, Alexander G.  
 CLMN Number of Claims: 8  
 ECL Exemplary Claim: 1  
 DRWN 1 Drawing Figure(s); 1 Drawing Page(s)  
 LN.CNT 1214

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An ammoxidation catalyst comprising a compound oxide which contains, in specific atomic ratios, molybdenum; vanadium; niobium; at least one element selected from tellurium and antimony; and at least one element selected from ytterbium, dysprosium, erbium, neodymium, samarium,

lanthanum, praseodymium, europium, gadolinium, terbium, holmium, thulium, lutetium and scandium. By the use of the ammoxidation catalyst of the present invention, the ammonia-based yield of acrylonitrile or methacrylonitrile can be largely increased without sacrificing the propane- or isobutane-based yield of acrylonitrile or methacrylonitrile. Thus, the feed-stock ammonia can be efficiently utilized in the ammoxidation of propane or isobutane while achieving an efficient utilization of propane or isobutane.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 224324-37-2P 224324-44-1P 224324-48-5P  
224324-51-0P 224324-60-1P 224324-73-6P

(ammoxidn. catalysts for manufacture of (meth)acrylonitrile)

L51 ANSWER 34 OF 37 USPATFULL on STN

AN 2000:37741 USPATFULL

TI Gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidation

IN Cirjak, Larry M., Burton Township, OH, United States

Venturelli, Anne, North Royalton, OH, United States

Cassidy, Timothy J., Buxton, United Kingdom

Pepera, Marc A., Northfield Center Township, OH, United States

Drenski, Tama L., Twinsburg, OH, United States

PA The Standard Oil Company, Chicago, IL, United States (U.S. corporation)

PI US 6043185

20000328

<--

AI US 1999-285384

19990402 (9)

<--

DT Utility

FS Granted

EXNAM Primary Examiner: Richter, Johann; Assistant Examiner: Murray, Joseph

LREP Yusko, David P., Oliver, Wallace L.

CLMN Number of Claims: 18

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 460

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst useful in the manufacture of acrylonitrile or methacrylonitrile by the catalytic reaction in the vapor phase of a paraffin selected from propane and isobutane with molecular oxygen and ammonia by catalytic contact of the reactants in a reaction zone with a catalyst, the feed composition having a mole ratio of the paraffin to ammonia in the range of about 1.0 to 10 and a mole ratio of paraffin to oxygen in the range of about 1.0 to 10, wherein said catalyst has the elements in the proportions indicated by the empirical formula:

MO.sub.a V.sub.b Sb.sub.c Ga.sub.d X.sub.e O.sub.x

where

X is one or more of As, Te, Se, Nb, Ta, W, Ti, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pd, Pt, B, In, Ce, Re, Ir, Ge, Sn, Bi, Y, Pr, an alkali metal, and an alkaline earth metal, preferably Nb, Ce, Fe, Ge, Sn, In, As, Se, and B, especially preferred being Nb,

a equals 1,

b equals 0.0 to 0.99, preferably 0.1 to 0.5,

c equals 0.01 to 0.9, preferably 0.05 to 0.5,

d equals 0.01 to 0.5, preferably 0.01 to 0.4,

e equals 0.0 to 1.0, preferably 0.0 to 0.9,

x is determined by the oxidation state of the cations present.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 261919-86-2

(gallium promoted molybdenum vanadium-antimony-oxide based catalyst for selective paraffin ammoxidn.)

L51 ANSWER 35 OF 37 USPATFULL on STN

AN 2000:31378 USPATFULL

TI Highly active and selective catalysts for the production of unsaturated nitriles, methods of making and using the same

IN Abdulwahed, Mazhar, Syria, Syria  
Yahyaoui, Khalid El, Meknes, Morocco

PA Saudi Basic Industries Corporation, Saudi Arabia (non-U.S. corporation)

PI US 6037304 20000314 <--

AI US 1999-228885 19990111 (9) <--

DT Utility

FS Granted

EXNAM Primary Examiner: Bell, Mark L.; Assistant Examiner: Hailey, Patricia L.

LREP Whitman Breed Abbott & Morgan LLP

CLMN Number of Claims: 10

ECL Exemplary Claim: 1

DRWN 1 Drawing Figure(s); 1 Drawing Page(s)

LN.CNT 317

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An improved catalyst for the production of unsaturated nitrites from their corresponding olefins, the catalyst having the atomic ratios described by the empirical formula Bi.sub.a Mo.sub.b V.sub.c Sb.sub.d Nb.sub.e A.sub.f B.sub.g O.sub.x and methods of using the same.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 260557-95-7

(highly active and selective catalysts for the production of unsatd. nitriles, methods of making and using the same)

L51 ANSWER 36 OF 37 USPATFULL on STN

AN 1999:155962 USPATFULL

TI Process for producing acrylic acid

IN Takahashi, Mamoru, Aichi, Japan

Tu, Xinlin, Aichi, Japan

Hirose, Toshiro, Aichi, Japan

Ishii, Masakazu, Aichi, Japan

PA Toagosei Co., Ltd., Tokyo, Japan (non-U.S. corporation)

PI US 5994580 19991130 <--

AI US 1997-955246 19971021 (8) <--

PRAI JP 1996-297755 19961021 <--

JP 1997-54200 19970212 <--

DT Utility

FS Granted

EXNAM Primary Examiner: Barts, Samuel; Assistant Examiner: Keys, Rosalynd

LREP Sughrue, Mion, Zinn, Macpeak & Seas, PLLC

CLMN Number of Claims: 4

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 712

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process for producing acrylic acid from propane and oxygen gas through

a vapor-phase catalytic oxidation reaction, said process comprising conducting the reaction using as a catalyst a metal oxide containing metallic elements Mo, V, Sb, and A (provided that A is at least one element selected from the group consisting of Nb, Ta, Sn, W, Ti, Ni, Fe, Cr, and Co). The metal oxide is prepared by a process including specific steps (1) and (2). The metal oxide may be supported on a compound containing specific elements.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 207615-99-4P 207616-00-0P 207616-02-2P

(preparation of acrylic acid from propane using mixed metal oxide catalysts)

L51 ANSWER 37 OF 37 USPATFULL on STN

AN 95:108145 USPATFULL

TI Catalyst for the production of nitriles

IN Ushikubo, Takashi, Yokohama, Japan

Oshima, Kazunori, Machida, Japan

Kayo, Atsushi, Kurashiki, Japan

Umezawa, Tiaki, Yokkaichi, Japan

Kiyono, Ken-ichi, Machida, Japan

Sawaki, Itaru, Yokohama, Japan

Nakamura, Hiroya, Yokohama, Japan

PA Mitsubishi Chemical Corporation, Tokyo, Japan (non-U.S. corporation)

PI US 5472925 19951205 <--

AI US 1994-193403 19940207 (8) <--

RLI Continuation-in-part of Ser. No. US 1993-121564, filed on 16 Sep 1993, now abandoned which is a division of Ser. No. US 1992-926173, filed on 7 Aug 1992, now patented, Pat. No. US 5281745

PRAI JP 1991-199573 19910808 <--

JP 1992-18962 19920204 <--

JP 1993-18923 19930205 <--

DT Utility

FS Granted

EXNAM Primary Examiner: McFarlane, Anthony

LREP Oblon, Spivak, McClelland, Maier & Neustadt

CLMN Number of Claims: 19

ECL Exemplary Claim: 1,6

DRWN 2 Drawing Figure(s); 2 Drawing Page(s)

LN.CNT 1747

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst for the production of a nitrile from an alkane, which satisfies the following conditions 1 and 2:

1 the catalyst is represented by the empirical formula:

$$\text{Mo.sub.a V.sub.b Te.sub.c X.sub.x O.sub.n} \quad (1)$$

wherein X is at least one element selected from the group consisting of Nb, Ta, W, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pd, Pt, Sb, Bi, B and Ce,

when a=1,

b=0.01 to 1.0,

c=0.01 to 1.0,

x=0.01 to 1.0,

and n is a number such that the total valency of the metal elements is

satisfied; and

2 the catalyst has X-ray diffraction peaks at the following angles of 2 $\theta$  in its X-ray diffraction pattern:

Diffraction

angles of 2 $\theta$  (°)

22.1 $\pm$ 0.3

28.2 $\pm$ 0.3

36.2 $\pm$ 0.3

45.2 $\pm$ 0.3

50.0 $\pm$ 0.3.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-42-3, Molybdenum niobium palladium tellurium vanadium oxide  
(molybdenum oxide ammoxidn. catalyst for the production of nitriles)

=> d 152 bib abs hitrn tot

L52 ANSWER 1 OF 7 USPATFULL on STN

AN 2005:23396 USPATFULL

TI Methods and systems for high throughput analysis

IN Linsen, Michael William, North Wales, PA, UNITED STATES

Schmitt, Edward Albert, UNITED STATES

Schure, Mark Richard, UNITED STATES

PI US 2005019940 A1 20050127

AI US 2004-910974 A1 20040804 (10)

RLI Division of Ser. No. US 2002-307654, filed on 2 Dec 2002, PENDING

PRAI US 2001-339903P 20011217 (60)

DT Utility

FS APPLICATION

LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399

CLMN Number of Claims: 16

ECL Exemplary Claim: CLM-01-21

DRWN 10 Drawing Page(s)

LN.CNT 851

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Methods of analyzing processes for making catalysts and/or certain properties of catalysts using a plurality of reaction zones are provided. The methods of the present invention have the capability to define and execute, in rapid succession, a plurality of experiments under disparate reaction conditions. An operator may define and execute a plurality of experiments on user-defined quantities of disparate catalysts, using user-defined input feeds, residence times, and temperature profiles.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 261919-86-2 406675-87-4

(high throughput anal. of catalysts for conversion of propane to acrylic acid)

L52 ANSWER 2 OF 7 USPATFULL on STN

AN 2004:315527 USPATFULL  
TI Ethane oxidation catalyst and process utilising the catalyst  
IN Ellis, Brian, Lower Sunbury, UNITED KINGDOM  
PI US 2004249204 A1 20041209  
AI US 2004-491287 A1 20040331 (10)  
WO 2002-GB4018 20020904  
PRAI GB 2001-24835 20011016  
DT Utility  
FS APPLICATION  
LREP NIXON & VANDERHYE, PC, 1100 N GLEBE ROAD, 8TH FLOOR, ARLINGTON, VA,  
22201-4714  
CLMN Number of Claims: 12  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 402  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB A catalyst composition and its use for the selective oxidation of ethane to acetic acid and/or for the selective oxidation of ethylene to acetic acid which composition comprises in combination with oxygen the elements molybdenum, vanadium, niobium, gold in the absence of palladium according to the empirical formula:  $\text{Mo.sub.aW.sub.bAu.sub.cV.sub.dNb.sub.eZ.sub.f}$  wherein Z is one or more elements selected from the group consisting of B, Al, Ga, In, Ge, Sn, Pb, Sb, Cu, Pt, Ag, Fe and Re; a, b, c, d, e and f represent the gram atom ratios of the elements such that:  $0 < a \leq 1$ ;  $0 \leq b < 1$  and  $a + b = 1$ ;  $10 \cdot \text{sup.} - 5 \phi c \leq 0.02$ ;  $0 < d \leq 2$ ;  $0 < e \leq 1$ ; and  $0.0001 \leq f \leq 0.05$ .

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 511313-29-4

(ethane oxidation catalyst for acetic acid manufacture)

L52 ANSWER 3 OF 7 USPATFULL on STN

AN 2003:182049 USPATFULL  
TI Methods and systems for high throughput analysis  
IN Linsen, Michael William, North Wales, PA, UNITED STATES  
Schmitt, Edward Albert, UNITED STATES  
Schure, Mark Richard, UNITED STATES  
PI US 2003125884 A1 20030703  
US 6901334 B2 20050531  
AI US 2002-307654 A1 20021202 (10)  
PRAI US 2001-339903P 20011217 (60)  
DT Utility  
FS APPLICATION  
LREP ROHM AND HAAS COMPANY, PATENT DEPARTMENT, 100 INDEPENDENCE MALL WEST,  
PHILADELPHIA, PA, 19106-2399  
CLMN Number of Claims: 36  
ECL Exemplary Claim: 1  
DRWN 10 Drawing Page(s)  
LN.CNT 1019  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB Methods of analyzing processes for making catalysts and/or certain properties of catalysts using a plurality of reaction zones are provided. The methods of the present invention have the capability to define and execute, in rapid succession, a plurality of experiments under disparate reaction conditions. An operator may define and execute a plurality of experiments on user-defined quantities of disparate catalysts, using user-defined input feeds, residence times, and temperature profiles.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 261919-86-2 406675-87-4

(high throughput anal. of catalysts for conversion of propane to acrylic acid)

L52 ANSWER 4 OF 7 USPATFULL on STN

AN 2000:174867 USPATFULL

TI Process for the simultaneous preparation of acrylonitrile and acrylic acid

IN Kayou, Atsushi, Okayama, Japan

Ihara, Tatsuya, Okayama, Japan

PA Mitsubishi Chemical Corporation, Tokyo, Japan (non-U.S. corporation)

PI US 6166241 20001226

WO 9822421 19980528

AI US 1999-284993 19990513 (9)

WO 1997-JP4169 19971117

19990513 PCT 371 date

19990513 PCT 102(e) date

PRAI JP 1996-304502 19961115

DT Utility

FS Granted

EXNAM Primary Examiner: Tsang, Cecilia; Assistant Examiner: Murray, Joseph

LREP Oblon, Spivak, McClelland, Maier &amp; Neustadt, P.C.

CLMN Number of Claims: 13

ECL Exemplary Claim: 1

DRWN 2 Drawing Figure(s); 2 Drawing Page(s)

LN.CNT 627

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention relates to a method for the simultaneous production of acrylonitrile and acrylic acid by reacting propane with ammonia and oxygen in the gas phase catalytic oxidation in the presence of a metal oxide catalyst containing vanadium and at least one member selected from tellurium, antimony and molybdenum and adjusting the molar ratio of propane to ammonia to from 2 to 10 and the molar ratio of oxygen to ammonia to from 2 to 10.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 146569-65-5

(simultaneous preparation of acrylonitrile and acrylic acid by gas-phase catalytic oxidation of propane)

L52 ANSWER 5 OF 7 USPATFULL on STN

AN 95:4048 USPATFULL

TI Method for producing an unsaturated carboxylic acid

IN Ushikubo, Takashi, Yokohama, Japan

Nakamura, Hiroya, Yokohama, Japan

Koyasu, Yukio, Tokyo, Japan

Wajiki, Shin, Tokyo, Japan

PA Mitsubishi Kasei Corporation, Tokyo, Japan (non-U.S. corporation)

PI US 5380933 19950110

AI US 1994-187719 19940128 (8)

PRAI JP 1993-12616 19930128

JP 1993-153651 19930624

JP 1993-308013 19931208

DT Utility

FS Granted

EXNAM Primary Examiner: Prescott, Arthur C.

LREP Oblon, Spivak, McClelland, Maier &amp; Neustadt

CLMN Number of Claims: 13

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 556

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A method for producing an unsaturated carboxylic acid, which comprises subjecting an alkane to a vapor phase catalytic oxidation reaction in the presence of a catalyst containing a mixed metal oxide comprising, as essential components, Mo, V, Te, O and X wherein X is at least one element selected from the group consisting of niobium, tantalum, tungsten, titanium, aluminum, zirconium, chromium, manganese, iron, ruthenium, cobalt, rhodium, nickel, palladium, platinum, antimony, bismuth, boron, indium and cerium, wherein the proportions of the respective essential components, based on the total amount of the essential components exclusive of oxygen, satisfy the following formulas:

$$0.25 < r.\text{sub}.\text{Mo} < 0.98$$

$$0.003 < r.\text{sub}.\text{V} < 0.5$$

$$0.003 < r.\text{sub}.\text{Te} < 0.5$$

$$0.003 < r.\text{sub}.\text{X} < 0.5$$

wherein  $r.\text{sub}.\text{Mo}$ ,  $r.\text{sub}.\text{V}$ ,  $r.\text{sub}.\text{Te}$  and  $r.\text{sub}.\text{X}$  are molar fractions of Mo, V, Te and X, respectively, based on the total amount of the essential components exclusive of oxygen.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-40-1, Bismuth molybdenum niobium tellurium vanadium oxide  
(catalyst for conversion to acrylic acid)

L52 ANSWER 6 OF 7 USPATFULL on STN

AN 94:7838 USPATFULL

TI Process for producing nitriles

IN Ushikubo, Takashi, Yokohama, Japan

Oshima, Kazunori, Tokyo, Japan

Kayo, Atsushi, Kurashiki, Japan

Umezawa, Tiaki, Yokkaichi, Japan

Kiyono, Ken-ichi, Tokyo, Japan

Sawaki, Itaru, Yokkaichi, Japan

PA Mitsubishi Kasei Corporation, Tokyo, Japan (non-U.S. corporation)

PI US 5281745 19940125

AI US 1992-926173 19920807 (7)

PRAI JP 1991-199573 19910808

JP 1992-18962 19920204

DT Utility

FS Granted

EXNAM Primary Examiner: Brust, Joseph Paul

LREP Oblon, Spivak, McClelland, Maier &amp; Neustadt

CLMN Number of Claims: 12

ECL Exemplary Claim: 1

DRWN 2 Drawing Figure(s); 2 Drawing Page(s)

LN.CNT 1434

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process for producing a nitrile, which comprises subjecting an alkane and ammonia in the gaseous state to catalytic oxidation in the presence of a catalyst which satisfies the following conditions of (1) and (2):

(1) the catalyst is represented by the empirical formula:

$$\text{Mo}.\text{sub}.\text{a} \text{ V}.\text{sub}.\text{b} \text{ Te}.\text{sub}.\text{c} \text{ X}.\text{sub}.\text{x} \text{ O}.\text{sub}.\text{n} \quad (1)$$



wherein X is at least one element selected from the group consisting of Nb, Ta, W, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pd, Pt, Sb, Bi, B and Ce,

---

when  $a = 1$ ,  
 $b = 0.01$  to  $1.0$ ,  
 $c = 0.01$  to  $1.0$ ,  
 $x = 0.01$  to  $1.0$ ,

---

and n is a number such that the total valency of the metal elements is satisfied; and

(2) the catalyst has X-ray diffraction peaks at the following angles of  $2\theta$  in its X-ray diffraction pattern:

Diffraction angles of $2\theta$ ( $^\circ$ )		
	$22.1 \pm 0.3$	$28.2 \pm 0.3$
$36.2 \pm 0.3$	$45.2 \pm 0.3$	$50.0 \pm 0.3$

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 149920-38-7 149920-40-1 149920-41-2

149920-42-3

(catalysts, for ammoxidn. of alkanes with air and ammonia)

L52 ANSWER 7 OF 7 USPATFULL on STN

AN 93:61222 USPATFULL

TI Process for producing nitriles

IN Ushikubo, Takashi, Yokohama, Japan

Oshima, Kazunori, Machida, Japan

Umezawa, Tiaki, Yokkaichi, Japan

Kiyono, Ken-ichi, Machida, Japan

PA Mitsubishi Kasei Corporation, Tokyo, Japan (non-U.S. corporation)

PI US 5231214 19930727

AI US 1992-880687 19920508 (7)

PRAI JP 1991-104382 19910509

DT Utility

FS Granted

EXNAM Primary Examiner: Brust, Joseph Paul

LREP Oblon, Spivak, McClelland, Maier & Neustadt

CLMN Number of Claims: 11

ECL Exemplary Claim: 1

DRWN No Drawings

LN.CNT 602

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process for producing a nitrile, which comprises subjecting an alkane and ammonia in the gaseous state to catalytic oxidation in the presence of an oxide of the formula:

$\text{Mo}_{.a} \text{V}_{.b} \text{Te}_{.c} \text{Nb}_{.d} \text{X}_{.x} \text{O}_{.n}$  (1)

wherein X is at least one element selected from the group consisting of Mg, Ca, Sr, Ba, Al, Ga, Tl, In, Ti, Zr, Hf, Ta, Cr, Mn, W, Fe, Ru, Co, Rh, Ni, Pd, Pt, Zn, Sn, Pb, As, Sb, Bi, La and Ce,

when  $a=1$ ,

$b=0.01$  to  $1.0$ ,

c=0.01 to 1.0,

d=0 to 1.0, and

x=0.0005 to 1.0,

and n is a number such that the total valency of the metal elements is satisfied.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

IT 146569-65-5 146569-67-7 146569-68-8  
146569-69-9 146569-70-2  
(catalyst, for ammoxidn. of propane)

=> d his

(FILE 'HOME' ENTERED AT 13:34:26 ON 19 JUL 2005)  
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 13:34:33 ON 19 JUL 2005

L1 1 S US20040063990/PN OR (US2003-676334# OR US2002-415288#)/AP,PRN  
E GAFFNEY A/AU  
L2 110 S E3,E4,E10,E11,E14,E15  
E SONG R/AU  
L3 65 S E3-E9  
E SONG RUO/AU  
L4 25 S E3,E10  
L5 8568 S ((ROHM? OR ROEHM?) (L)HAAS?)/PA,CS  
L6 51 S L2-L4 AND CATALY?/SC,SX  
L7 94 S L2-L4 AND CATALY?/CW,CT  
L8 91 S L2-L4 AND CAT/RL  
L9 108 S L6-L8  
L10 1 S L1 AND L2-L9  
SEL RN

FILE 'REGISTRY' ENTERED AT 13:38:38 ON 19 JUL 2005

L11 46 S E1-E46  
L12 26 S L11 NOT TIS/CI  
L13 20 S L11 NOT L12  
L14 156 S (MO AND V AND NB AND O)/ELS AND (TE OR SB)/ELS  
L15 75 S L14 AND 6/ELC.SUB  
L16 125 S L14 AND (LI OR NA OR K OR RB OR CS OR MG OR CA OR SR OR BA OR  
L17 33 S L14 AND (BI OR SE OR F OR CL OR BR OR I OR PR OR ND OR SM OR  
L18 135 S L16,L17  
L19 63 S L18 AND L15  
L20 20 S L13 AND L19  
L21 43 S L19 NOT L20  
L22 25 S L21 AND SB/ELS  
L23 4 S L22 AND (TL OR GE OR AL OR SN)/ELS  
L24 21 S L22 NOT L23  
L25 18 S L21 NOT L22  
L26 59 S L20,L24,L25  
L27 76 S L18 NOT L26  
SAV L26 SACKY676/A

FILE 'HCAOLD' ENTERED AT 14:14:48 ON 19 JUL 2005

L28 0 S L26

FILE 'HCAPLUS' ENTERED AT 14:14:53 ON 19 JUL 2005

L29 51 S L26  
L30 28 S L26 (L) PREP+NT/RL  
L31 11 S L1-L10 AND L30  
L32 46 S L29 AND (PD<=20021001 OR PRD<=20021001 OR AD<=20021001)  
L33 26 S L30 AND L32  
L34 10 S L31 AND L32  
L35 1 S L31 NOT L34  
L36 11 S L31,L34,L35  
L37 27 S L33,L36  
L38 20 S L32 NOT L37

FILE 'USPATFULL' ENTERED AT 14:20:33 ON 19 JUL 2005

L39 44 S L26  
L40 0 S L39 AND B01J037/IPC  
L41 32 S L39 AND B01J/IPC  
L42 41 S L39 AND (PD<=20021001 OR PRD<=20021001 OR AD<=20021001)  
L43 19 S L39 AND (GAFFNEY ? OR SONG ?)/AU  
L44 3 S L39 AND (ROHM? OR ROEHM?)/PA  
L45 29 S L41 AND L42  
L46 31 S L43,L44,L45  
L47 13 S L39,L42 NOT L46

FILE 'REGISTRY' ENTERED AT 14:23:31 ON 19 JUL 2005

FILE 'HCAPLUS' ENTERED AT 14:25:39 ON 19 JUL 2005

FILE 'USPATFULL' ENTERED AT 14:26:43 ON 19 JUL 2005

L48 29 S L26/P  
L49 27 S L48 AND L42  
L50 29 S L48,L49  
L51 37 S L50,L46  
L52 7 S L39 NOT L51

=>

=> fil wpix

FILE 'WPIX' ENTERED AT 14:55:47 ON 19 JUL 2005  
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FILE LAST UPDATED: 15 JUL 2005 <20050715/UP>  
MOST RECENT DERWENT UPDATE: 200545 <200545/DW>  
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[http://www.stn-international.de/training\\_center/patents/stn\\_guide.pdf](http://www.stn-international.de/training_center/patents/stn_guide.pdf) <<<

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<http://thomsonderwent.com/coverage/latestupdates/> <<<

>>> FOR INFORMATION ON ALL DERWENT WORLD PATENTS INDEX USER  
GUIDES, PLEASE VISIT:  
<http://thomsonderwent.com/support/userguides/> <<<

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FOR FURTHER DETAILS: <http://www.thomsonderwent.com/dwpifv> <<<

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<http://thomsonderwent.com/support/dwpieref/reftools/classification/code-revision/>  
FOR DETAILS. <<<

=> d his

(FILE 'HOME' ENTERED AT 14:34:30 ON 19 JUL 2005)  
SET COST OFF

FILE 'WPIX' ENTERED AT 14:34:40 ON 19 JUL 2005

L1	10808 S B01J037/IPC
L2	234 S B01J023-28/IPC AND L1
L3	42 S L2 AND B01J037-04/IPC
L4	53 S L2 AND B01J037-08/IPC
L5	12 S L2 AND B01J037-10/IPC
L6	1 S L3 AND L4 AND L5
L7	18 S L3 AND L4, L5
L8	3 S L4 AND L5
L9	19 S L7, L8 NOT L6
L10	7978 S N06-E?/MC
L11	17059 S L1, L10
L12	302 S B01J023-28/IPC AND L11
L13	1255 S (N03-D02 OR N03-D)/MC AND L11
L14	926 S (M25-G18 OR B04-A03B OR C05-A03B OR E35-Q OR E05-M)/MC AND L1
L15	2069 S L12-L14
L16	163 S L15 AND B01J037-04/IPC
L17	163 S L15 AND B01J037-08/IPC
L18	30 S L15 AND B01J037-10/IPC
L19	1 S L16 AND L17 AND L18
L20	136 S L15 AND ("E11-E" OR N07-C)/MC
L21	48 S L15 AND E31-G/MC
L22	95 S L15 AND (E31-M OR E05-J)/MC
L23	113 S L21, L22
L24	23 S L23 AND L16

L25 8 S L24 AND L17  
 L26 1 S L24 AND L18  
 L27 8 S L25,L26  
 L28 7 S L27 NOT L19  
 L29 15 S L24 NOT L25-L28

FILE 'WPIX' ENTERED AT 14:55:47 ON 19 JUL 2005

=> d all abeq tech abex tot l28

L28 ANSWER 1 OF 7 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN  
 AN 2003-259117 [26] WPIX  
 DNC C2003-067733  
 TI Catalyst for forming unsaturated carboxylic acid and unsaturated nitrile,  
 comprising mixed metal oxide is new.  
 DC A41 E16  
 IN GAFFNEY, A M; SONG, R  
 PA (ROHM) ROHM & HAAS CO; (GAFF-I) GAFFNEY A M; (SONG-I) SONG R  
 CYC 31  
 PI EP 1270068 A1 20030102 (200326)\* EN 22 B01J023-22  
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI TR  
 US 2003004379 A1 20030102 (200326) B01J023-22  
 BR 2002002283 A 20030422 (200330) B01J027-02  
 JP 2003088758 A 20030325 (200330) 20 B01J027-057  
 KR 2002096982 A 20021231 (200330) B01J023-64  
 CN 1395997 A 20030212 (200335) B01J027-057  
 US 6746983 B2 20040608 (200437) B01J023-00  
 US 2004181084 A1 20040916 (200461) C07C253-34  
 ADT EP 1270068 A1 EP 2002-253989 20020607; US 2003004379 A1 Provisional US  
 2001-299213P 20010618, US 2002-165892 20020610; BR 2002002283 A BR  
 2002-2283 20020617; JP 2003088758 A JP 2002-176924 20020618; KR 2002096982  
 A KR 2002-34031 20020618; CN 1395997 A CN 2002-122658 20020618; US 6746983  
 B2 Provisional US 2001-299213P 20010618, US 2002-165892 20020610; US  
 2004181084 A1 Provisional US 2001-299213P 20010618, Div ex US 2002-165892  
 20020610, US 2004-806582 20040323  
 FDT US 2004181084 A1 Div ex US 6746983  
 PRAI US 2001-299213P 20010618; US 2002-165892 20020610;  
 US 2004-806582 20040323  
 IC ICM B01J023-00; B01J023-22; B01J023-64; B01J027-02; B01J027-057;  
 C07C253-34  
 ICS B01J023-16; B01J023-18; B01J023-20; **B01J023-28**; B01J023-68;  
 B01J023-88; B01J023-887; B01J027-132; **B01J037-04**;  
**B01J037-08**; C07C027-16; C07C051-16; C07C051-215; C07C057-05;  
 C07C253-24; C07C253-30; C07C255-07; C07C255-08  
 ICA C07B061-00  
 AB EP 1270068 A UPAB: 20031203  
 NOVELTY - A catalyst comprising mixed metal oxide, is new.  
 DETAILED DESCRIPTION - A catalyst (MoaVbMcXdOe), is new.  
 M = tellurium, antimony or niobium;  
 X = scandium, yttrium, lanthanum, rhenium, iridium, copper, silver,  
 gold, zinc, gallium, silicon, germanium, arsenic, lead, sulfur, selenium,  
 tin, bismuth, fluorine, chlorine, bromine or iodine  
 when a = 1, b,c = 0.01-1, d = 0-1 and e = oxidation state of other  
 elements, and when d = 0 and M = tellurium, b = 0.01-0.5 or c = 0.17-1.  
 INDEPENDENT CLAIMS are also included for:  
 (1) production of catalyst which involves admixing compounds of  
 elements Mo, V, M and X and a solvent comprising water to form an  
 admixture (I) containing at least 2 but less than all of the elements,  
 heating the admixture at 80-150 deg. C for 5 minutes to 48 hours, then

admixing compounds of elements Mo, V, M and X with admixture (I) to form an admixture (II), heating the admixture (II) at 50-300 deg. C for 1 hour to several weeks in a closed vessel under pressure, and recovering insoluble material from the closed vessel;

(2) production of unsaturated carboxylic acid which involves subjecting alkane or mixture of alkane and alkene to vapor phase catalytic oxidation reaction in presence of the catalyst; and

(3) production of unsaturated nitrile which involves subjecting alkane or mixture of alkane and alkene, and ammonia to vapor phase catalytic oxidation reaction in presence of the catalyst.

USE - For production of unsaturated carboxylic acids and unsaturated nitriles (both claimed). The unsaturated nitriles such as acrylonitrile and methacrylonitrile are used as intermediates for preparation of fibers, synthetic resins and synthetic rubbers. The unsaturated carboxylic acids such as acrylic acid and methacrylic acid are used as starting materials for synthetic resins, coating materials and plasticizers.

ADVANTAGE - The catalyst exhibits good catalytic activities and the yield of unsaturated carboxylic acid is improved. The catalyst is operated more efficiently at lower temperature which significantly reduces the formation of acetic acid and carbon oxides, and increases selectivity to acrylic acid.

Dwg.0/0

FS

CPI

FA

AB; DCN

MC

CPI: A01-D04; A01-D08; E10-A15B; E10-C04; E11-E; E31-F03; **E31-G**;  
E31-L; **E31-M**; E31-P05; E34-E; E35; N01-D02; N02-D; N02-E03;  
N02-E04; N03; N04-A; **N06-E01**; N07-C

TECH

UPTX: 20031203

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Method: The preparation of catalyst further involves calcinating the recovered insoluble material.

ABEX

UPTX: 20031203

EXAMPLE - Tellurium dioxide (1.59 g) and ammonium heptamolybdate tetrahydrate (20 ml) in water were added to a 45 ml Parr acid digestion bomb. The mixture was hydrothermally treated at 100 degrees C for 1 hour, and then vanadyl sulfate hydrate (10 ml) in water was added to the bomb at 60 degrees C with stirring. The bomb contents were hydrothermally treated at 175 degrees C for 60 hours. Black solids formed on the wall and bottom of the bomb were collected by gravity filtration, washed with deionized water (50 ml), dried in a vacuum oven at 25 degrees C overnight, and then calcined in air from 25-275 degrees C at 10 degreesC/minute and held at 275 degrees C for 1 hour, then in argon from 275-575 degrees C at 2 degreesC/minute and held at 575 degrees C for 2 hours. The final catalyst had a nominal composition of MoV<sub>0.5</sub>Te<sub>0.57</sub>O<sub>x</sub>. The obtained catalyst was pressed in a mold and then broken and sieved to 10-20 mesh granules for reactor evaluation. The catalyst bed was positioned with glass wool in a reactor and heated with an electric furnace. A feed gas stream of propane, steam and air with a feed ratio of 1:3:96 was supplied to the reactor. The reaction was performed at 381 degrees C. The yield of acrylic acid was 31% and the conversion of propane was 50%.

L28

ANSWER 2 OF 7 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN

2003-169124 [17] WPIX

DNC

C2003-044176

TI

Preparation of improved catalyst for oxidizing, e.g., alkane, involves contacting mixed metal oxide with liquid contact component, recovering and calcining insoluble materials, and promoting the so-formed catalyst with promoters.

DC

A41 E16 J04

IN

GAFFNEY, A M; HEFFNER, M D; SONG, R

PA

(ROHM) ROHM & HAAS CO; (GAFF-I) GAFFNEY A M; (HEFF-I) HEFFNER M D;

(SONG-I) SONG R

CYC. 33

PI EP 1254706 A2 20021106 (200317)\* EN 18 B01J023-00  
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI TR

US 2002183198 A1 20021205 (200317) C07C051-34  
 KR 2002082766 A 20021031 (200319) B01J027-057  
 JP 2003038960 A 20030212 (200321) 17 B01J027-057  
 CN 1383916 A 20021211 (200324) B01J027-057  
 BR 2002001364 A 20030610 (200341) B01J037-04 <--  
 US 6645905 B2 20031111 (200382) B01J023-00  
 US 2004029725 A1 20040212 (200412) B01J027-14  
 MX 2002003871 A1 20030701 (200420) B01J006-00  
 TW 575542 A 20040211 (200454) C07C253-24

ADT EP 1254706 A2 EP 2002-252860 20020423; US 2002183198 A1 Provisional US  
 2001-286278P 20010425, US 2002-117904 20020408; KR 2002082766 A KR  
 2002-21919 20020422; JP 2003038960 A JP 2002-123833 20020425; CN 1383916 A  
 CN 2002-118440 20020425; BR 2002001364 A BR 2002-1364 20020422; US 6645905  
 B2 Provisional US 2001-286278P 20010425, US 2002-117904 20020408; US  
 2004029725 A1 Provisional US 2001-286278P 20010425, Div ex US 2002-117904  
 20020408, US 2003-636113 20030807; MX 2002003871 A1 MX 2002-3871 20020418;  
 TW 575542 A TW 2002-107761 20020416

FDT US 2004029725 A1 Div ex US 6645905

PRAI US 2001-286278P 20010425; US 2002-117904 20020408;

US 2003-636113 20030807

IC ICM B01J006-00; B01J023-00; B01J027-057; B01J027-14; **B01J037-04**  
 ; C07C051-34; C07C253-24

ICS B01J023-10; B01J023-20; **B01J023-28**; B01J023-887;  
 B01J027-186; B01J027-187; B01J027-188; B01J027-19; B01J027-192;  
 B01J027-198; B01J027-199; B01J027-57; **B01J037-00**;  
**B01J037-08**; C01G039-00; C07C051-16; C07C051-215; C07C057-05;  
 C07C253-00; C07C253-22; C07C255-08

ICA C07B061-00

AB EP 1254706 A UPAB: 20030312

NOVELTY - Providing a method for improving the performance of mixed metal  
 oxide catalysts.

DETAILED DESCRIPTION - Preparation of an improved catalyst involves:

(1) providing a mixed metal oxide of formula (AaVbNcXdOe);  
 (2) contacting the mixed metal oxide with a liquid contact component,  
 such as, organic acids, alcohols, inorganic acid or hydrogen peroxide to  
 form a contact mixture;

(3) recovering insoluble material from the contact mixture;

(4) calcining the recovered insoluble material in a non-oxidizing  
 atmosphere;

(5) admixing the calcined recovered insoluble material with a  
 promoter element(s) or its compound(s), or a solvent(s) from the promoter  
 element or its compound to form an admixture;

(6) removing the solvent(s) from the so-formed admixture to form a  
 catalyst precursor; and

(7) calcining the catalyst precursor.

The promoter element can be gold, silver, rhenium, praseodymium,  
 zinc, gallium, palladium, iridium, neodymium, yttrium, samarium, terbium,  
 bromine, copper, scandium, chlorine, fluorine or iodine.

A = Mo or W;

N = Te, Sb or Se;

X = Nb, Ta, Ti, Al, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce,  
 As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm,  
 Eu, Gd, Dy, Ho, Er, Tm, Yb, or Lu;

a = 1;

b = 0.01-2;

c = 0.01-1;

d = 0.01-1

The subcomponent (e) is dependent on the oxidation state of the other elements. The components A, V, N and X are present in such amounts than the atomic ratio of A:V:N:X is a:b:c:d.

An INDEPENDENT CLAIM is included for a process for producing an unsaturated carboxylic acid comprising subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of the inventive catalyst.

USE - For preparing improved catalyst useful for oxidizing alkanes, or a mixture of alkanes and alkenes.

ADVANTAGE - The improved catalyst exhibits excellent catalytic activities by itself.

Dwg.0/0

FS

CPI

FA

AB; DCN

MC

CPI: A01-D08; E10-A15B; E10-C04G1A; E10-C04G1B; E10-C04H; E11-E;

E31-G; E31-K01; E31-L; E31-Q07; E35; E35-N; J04-E01;

J04-E04A; N01; N02; N03; N03-C01; N04; N06-E01; N07-C

ABEX

UPTX: 20030312

EXAMPLE - A catalyst (6 g) was impregnated with 1.72 g samarium in 5% nitric acid and 5.2 g water followed by drying via rotavap at 50degrees C and further vacuum dried at 25degrees C overnight. These dried materials were then calcined by placing the solid materials in an air atmosphere and then heating them to 275degrees C at 10degreesC/min and holding them under the air atmosphere at 275degrees C for 1 hour. The atmosphere was then changed to argon and the material was heated from 275degrees C to 600degrees C at 2degrees C/min and then material was held under the argon atmosphere at 600degrees C for 5 hours. The final catalyst had a nominal composition of Mo1V0.3Te0.23Nb0.125Sm0.0025Ox. The catalyst thus obtained was pressed in a mold and then broken and sieved to 10-20 mesh granules for reactor evaluation.

L28 ANSWER 3 OF 7 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2003-128650 [12] WPIX

CR 2004-688114 [67]

DNC C2003-032800

TI Catalyst component, used for preparation of unsaturated carboxylic acids and unsaturated nitriles, consists of orthorhombic phase of mixed metal oxide.

DC E17 J04

IN BOGAN, L E; BORS, D A; CAVALCANTI, F A P; CLARK, M B; GAFFNEY, A M; HAN, S

PA (ROHM) ROHM & HAAS CO; (BOGA-I) BOGAN L E; (BORS-I) BORS D A; (CAVA-I) CAVALCANTI F A P; (CLAR-I) CLARK M B; (GAFF-I) GAFFNEY A M; (HANS-I) HAN S

CYC 32

PI US 2002161256 A1 20021031 (200312)\* 10 C07C253-34

EP 1254710 A2 20021106 (200313) EN B01J023-00

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT

RO SE SI TR

JP 2003024787 A 20030128 (200318) 12 B01J027-057

KR 2002082763 A 20021031 (200319) B01J027-057

CN 1395996 A 20030212 (200335) B01J027-057

BR 2002001367 A 20030610 (200341) B01J027-057

MX 2002003869 A1 20030701 (200420) B01J029-00

US 6740620 B2 20040525 (200435) B01J023-00

ADT US 2002161256 A1 Provisional US 2001-286235P 20010425, US 2002-117859

20020408; EP 1254710 A2 EP 2002-252867 20020423; JP 2003024787 A JP

2002-123812 20020425; KR 2002082763 A KR 2002-21916 20020422; CN 1395996 A

CN 2002-118443 20020425; BR 2002001367 A BR 2002-1367 20020422; MX

2002003869 A1 MX 2002-3869 20020418; US 6740620 B2 Provisional US



2001-286235P 20010425, US 2002-117859 20020408

PRAI US 2001-286235P 20010425; US 2002-117859 20020408

IC ICM B01J023-00; B01J027-057; B01J029-00; C07C253-34

ICS B01J023-16; B01J023-18; B01J023-20; **B01J023-28**; B01J023-32;  
 B01J023-48; B01J023-58; B01J023-70; B01J023-887; **B01J037-04**  
 ; **B01J037-08**; C01G039-00; C07C051-16; C07C051-215;  
 C07C057-05; C07C253-22; C07C253-24; C07C255-08

ICA C07B061-00

AB US2002161256 A UPAB: 20041019

NOVELTY - A catalyst component consists of the orthorhombic phase of a mixed metal oxide, which is active and selective for the preparation of unsaturated carboxylic acids and unsaturated nitriles.

DETAILED DESCRIPTION - A catalyst component which consists of the orthorhombic phase of a mixed metal oxide of the formula  $AaVbNcXdOe$  (I).  
 A = Mo and/or W;  
 N = Te and/or Se; and  
 X = at least one element selected from Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb, Lu, Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y, Sm, Tb, Br, Cu, Sc, Cl, F and I;  
 a = 1;  
 b = 0.01-1;  
 c = 0.01-1;  
 d = 0.01-1; and  
 e = dependent on the oxidation state of the other elements.

INDEPENDENT CLAIMS are included for:

(1) the preparation of an orthorhombic phase mixed metal oxide catalyst, comprising:

(a) admixing compounds of elements A, V, N and X and at least one solvent to form a solution, where N is at least one element selected from Te, Se and Sb;

(b) admixing a seeding effective amount of an orthorhombic phase mixed metal oxide seed, substantially free of hexagonal phase mixed metal oxide, with the solution to form a seeded solution;

(c) removing solvent from the seeded solution to form a catalyst precursor; and

(d) calcining the catalyst precursor to obtain the orthorhombic phase mixed metal oxide catalyst;

(2) production of an unsaturated carboxylic acid by subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation in the presence of the orthorhombic phase mixed metal oxide catalyst of formula (I) with N at least one element selected from Te, Se and Sb; and

(3) production of an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation in the presence of the orthorhombic phase mixed metal oxide catalyst of formula (I) with N being Te and/or Se.

USE - The catalyst component, consisting of the orthorhombic phase of a mixed metal oxide, is used in the preparation of unsaturated carboxylic acids and unsaturated nitriles by vapor phase catalytic oxidation of alkanes or a mixture of an alkane and an alkene

ADVANTAGE - The orthorhombic phase of the mixed metal oxide can be prepared selectively, in a quantitative yield. This orthorhombic phase of a mixed metal oxide is active and selective for the preparation of unsaturated carboxylic acids and unsaturated nitriles.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: E10-A15B; E10-C04H; E11-E; **E31-G**; J04-E04A; N01; N02; N03;  
 N04-A; **N06-E01**; N07-C01

TECH

UPTX: 20030218

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Catalyst Preparation: N is at least one element selected from Te and Se.

The orthorhombic phase mixed metal oxide seed, substantially free of hexagonal phase mixed metal oxide, is prepared by:

- (i) providing a mixed metal oxide of formula (I),
- (ii) contacting the mixed metal oxide with a liquid contact member selected from organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture; and
- (iii) recovering insoluble material from the contact mixture to obtain the orthorhombic phase mixed metal oxide seed substantially free of hexagonal phase mixed metal oxide.

The liquid contact member is preferably an aqueous solution of oxalic acid.

The orthorhombic phase mixed metal oxide catalyst can also be prepared by:

- (a) admixing compounds of elements A, V, N and X and at least one solvent to form a first mixture;
- (b) removing solvent from the first mixture to form a first precursor;
- (c) calcining the first precursor to form a first calcined precursor;
- (d) contacting the first calcined precursor with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture; and
- (e) recovering insoluble material from the contact mixture to obtain the orthorhombic phase mixed metal oxide seed, substantially free of hexagonal phase mixed metal oxide.

ABEX

UPTX: 20030218

EXAMPLE - In a comparative example, Mo-V-Te-Nb mixed metal oxide (56.60 g) was added to a solution of 23.3 g oxalic acid dihydrate in 215 g water and stirred 6 hrs at 70-80 degreesC. It was cooled, filtered and dried to yield 45.28 g black solid. The X-ray diffraction pattern for this sample showed significant intensity at 2theta values of 28.3 degrees and 36.2 degrees, indicative of the hexagonal phase.

Ammonium heptamolybdate tetrahydrate (17.03 g), ammonium metavanadate (3.35 g) and telluric acid (5.09 g) were dissolved in 284 g water with heating. The resulting orange solution was cooled to 40 degreesC. Oxalic acid dihydrate (0.97 g) was dissolved in a 6.5 weight % solution of niobium oxalate in water (99.33 g). The niobium solution was added to the orange solution, and then 100 mg of the material as prepared in comparative example was added to the combined solutions. The mixture was dried, first on a rotary evaporator, and then overnight, under vacuum (6 mbar). The resulting precursor was sieved to remove more than 50 mesh fines, then calcined in a flowing atmosphere as follows: in an air atmosphere, the precursor was heated from room temperature to 275 degrees at a rate of 10 degreesC/min and then held at 275 degreesC for 1 hr; the atmosphere was switched to argon; in an argon atmosphere, the precursor was heated from 275-600 degreesC at a rate of 2 degreesC/min and then held at 600 degreesC for 2 hrs. The X-ray diffraction pattern for this sample showed very little intensity at 2theta values of 28.3 degrees and 36.2 degrees, indicative of a lack of the hexagonal phase.

L28 ANSWER 4 OF 7 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2003-077652 [08] WPIX

DNC C2003-020322

TI Preparation of catalyst, used to produce unsaturated carboxylic acids and nitriles, providing mixed metal oxide of specified formula, contacting with liquid, recovering insoluble material, and calcining.

DC A41 E19 J04

IN BOGAN, L E; GAFFNEY, A M; HAN, S; HEFFNER, M D; SONG, R

PA (ROHM) ROHM & HAAS CO; (BOGA-I) BOGAN L E; (GAFF-I) GAFFNEY A M; (HANS-I) HAN S; (HEFF-I) HEFFNER M D; (SONG-I) SONG R

CYC 33

PI EP 1254709 A2 20021106 (200308)\* EN 15 B01J023-00  
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI TR

US 2002188149 A1 20021212 (200308) C07C253-24  
 JP 2003024789 A 20030128 (200318) 14 B01J027-057  
 KR 2002082765 A 20021031 (200319) B01J027-057  
 CN 1382522 A 20021204 (200322) B01J023-16  
 BR 2002001368 A 20030610 (200341) B01J037-04 <--  
 MX 2002003868 A1 20030701 (200420) B01J023-00  
 TW 574186 A 20040201 (200453) C07C253-24  
 US 2004181085 A1 20040916 (200461) B01J023-00  
 US 6841699 B2 20050111 (200505) B01J023-00

ADT EP 1254709 A2 EP 2002-252866 20020423; US 2002188149 A1 Provisional US  
 2001-286217P 20010425, US 2002-117908 20020408; JP 2003024789 A JP  
 2002-123817 20020425; KR 2002082765 A KR 2002-21918 20020422; CN 1382522 A  
 CN 2002-118441 20020425; BR 2002001368 A BR 2002-1368 20020422; MX  
 2002003868 A1 MX 2002-3868 20020418; TW 574186 A TW 2002-107753 20020416;  
 US 2004181085 A1 Provisional US 2001-286217P 20010425, Div ex US  
 2002-117908 20020408, US 2004-808861 20040324; US 6841699 B2 Provisional  
 US 2001-286217P 20010425, US 2002-117908 20020408

PRAI US 2001-286217P 20010425; US 2002-117908 20020408;  
 US 2004-808861 20040324

IC ICM B01J023-00; B01J023-16; B01J027-057; B01J037-04; C07C253-24  
 ICS B01J021-08; B01J021-12; B01J021-14; B01J023-20; B01J023-28;  
 B01J023-30; B01J023-34; B01J023-48; B01J023-76; B01J023-887;  
 B01J023-888; B01J023-889; B01J023-89; B01J027-06; B01J027-132;  
 B01J027-14; B01J027-186; B01J027-199; B01J037-06;  
 B01J037-08; C01B019-00; C07C051-16; C07C051-215; C07C051-25;  
 C07C057-05; C07C253-22; C07C253-26; C07C255-08

ICA C07B061-00

AB EP 1254709 A UPAB: 20031001

NOVELTY - Preparation of catalyst comprises:

- (a) Providing a mixed metal oxide of specified formula;C
- (b) Contacting the mixed metal oxide with a liquid contact member selected from organic acids, alcohols, inorganic acids and hydrogen;
- (c) Recovering insoluble material from the contact mixture; and
- (d) Calcining the recovered insoluble material in a non-oxidizing atmosphere to form the catalyst.

DETAILED DESCRIPTION - Preparation of catalyst comprises:

- (a) Providing a mixed metal oxide of formula (I);

AaVbNcXdOe (I)

A = Mo or W;

N = Te or Se;

X = Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In,  
 Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P,  
 Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb, Lu, Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y,  
 Sm, Tb, Br, Cu, Sc, Cl, F or I;

a = 1;

b = 0.1 - 2;

c = 0.1 - 1;

d = 0.01 - 1; and

e = dependent on the oxidation state of the other elements.

- (b) Contacting the mixed metal oxide with a liquid contact member selected from organic acids, alcohols, inorganic acids and hydrogen;
- (c) Recovering insoluble material from the contact mixture; and
- (d) Calcining the recovered insoluble material in a non-oxidizing atmosphere to form the catalyst.

INDEPENDENT CLAIMS are included for:

- (1) The catalyst produced by the process;

(2) Production of an unsaturated carboxylic acid comprising subjecting an alkane and/or alkene, to vapor phase catalytic oxidation reaction in the presence of the catalyst; and

(3) Production of an unsaturated nitrile which comprises subjecting an alkane and/or alkene and ammonia to vapor phase catalytic oxidation reaction in the presence of the catalyst.

USE - Used in vapor phase catalytic oxidation, to produce unsaturated carboxylic acids, such as (meth)acrylic acid, and unsaturated nitriles, such as (meth)acrylonitrile.

ADVANTAGE - The catalyst has improved oxidation/ammoxidation performance.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-D08; E10-A15B; E10-C02D1; E10-C02D2; E10-C04G1; E10-C04H; E10-C04J1U; E10-C04J2U; E10-C04L; E10-E04L; E31-E; **E31-G**; E31-H05; E31-K01; E31-L; E31-Q08; E35; J04-E03; J04-E04A; J04-E05; N01-C03; N01-D01; N02; N03; N04-B; N04-D; N07-C01; N07-D08B

TECH UPTX: 20031001

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Materials: The mixed metal oxide of step (a) is an orthorhombic phase mixed metal oxide, and the liquid contact member is an aqueous solution of oxalic acid, telluric acid, or nitric acid. The calcined recovered solid material is

L28 ANSWER 5 OF 7 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2003-077651 [08] WPIX

DNC C2003-020321

TI Preparation of catalyst, used to produce unsaturated carboxylic acids and nitriles, admixing compounds of elements Mo, V, N, X and Z and solvent(s), removing solvent(s), and calcining.

DC A41 E16 J04

IN BOGAN, L E; PAK, A; PARK, A

PA (ROHM) ROHM & HAAS CO; (BOGA-I) BOGAN L E; (PAKA-I) PAK A

CYC 33

PI EP 1254708 A2 20021106 (200308)\* EN 12 B01J023-00  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI TR

US 2002183548 A1 20021205 (200308) C07C051-21

JP 2003024790 A 20030128 (200318) 11 B01J027-057

KR 2002084419 A 20021107 (200320) B01J023-887

CN 1390641 A 20030115 (200330) B01J027-057

BR 2002001439 A 20030610 (200341) B01J037-04 <--

US 6645906 B2 20031111 (200382) B01J023-00

US 2004019233 A1 20040129 (200413) C07C253-24

MX 2002003873 A1 20030701 (200420) B01F015-06

TW 592802 A 20040621 (200506) B01J023-00

ADT EP 1254708 A2 EP 2002-252863 20020423; US 2002183548 A1 Provisional US

2001-287506P 20010430, US 2002-117944 20020408; JP 2003024790 A JP

2002-128072 20020430; KR 2002084419 A KR 2002-23800 20020430; CN 1390641 A

CN 2002-118861 20020429; BR 2002001439 A BR 2002-1439 20020426; US 6645906

B2 Provisional US 2001-287506P 20010430, US 2002-117944 20020408; US

2004019233 A1 Provisional US 2001-287506P 20010430, Div ex US 2002-117944

20020408, US 2003-622967 20030718; MX 2002003873 A1 MX 2002-3873 20020418;

TW 592802 A TW 2002-108111 20020419

FDT US 2004019233 A1 Div ex US 6645906

PRAI US 2001-287506P 20010430; US 2002-117944 20020408;

US 2003-622967 20030718

IC ICM B01F015-06; B01J023-00; B01J023-887; B01J027-057; **B01J037-04**  
; C07C051-21; C07C253-24

ICS B01J023-16; B01J023-20; **B01J023-28**; B01J023-88;  
**B01J037-08**; C01B019-00; C07C051-16; C07C051-215; C07C057-05;  
 C07C253-00; C07C253-22; C07C255-07; C07C255-08

ICA C07B061-00

AB EP 1254708 A UPAB: 20030204

NOVELTY - Production of catalyst of specified formula comprises:

(a) Admixing compounds of elements Mo, V, N, X and Z and solvent(s) at at least 45 deg. C;

(b) Removing the solvent(s) from the admixture to form a catalyst precursor; and

(c) Calcining the catalyst precursor to obtain the mixed metal oxide.

DETAILED DESCRIPTION - Production of catalyst comprising a mixed metal oxide of formula (I):

$\text{Mo}^a\text{V}^b\text{N}^c\text{X}^d\text{Z}^e\text{O}_f$  (I)

N = Te or Sb;

X = Nb, Ta, Ti, W, Se, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb or Lu;

Z = Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y, Sm, Tb, Br, Cu, Sc, Cl, F and I;

a = 1;

b = 0.01 - 1.0;

c = 0.01 - 1.0;

d = 0.01 - 1.0;

e = 0 - 0.1; and

f = dependent on the oxidation state of the other elements.

comprises:

(a) Admixing compounds of elements Mo, V, N, X and Z and solvent(s) at at least 45 deg. C;

(b) Removing the solvent(s) from the admixture to form a catalyst precursor; and

(c) Calcining the catalyst precursor to obtain the mixed metal oxide.

INDEPENDENT CLAIMS are included for:

(1) The catalyst produced by the process;

(2) Production of an unsaturated carboxylic acid comprising subjecting an alkane and/or alkene, to vapor phase catalytic oxidation reaction in the presence of the catalyst;

(3) Production of an unsaturated nitrile which comprises subjecting an alkane and/or alkene and ammonia to vapor phase catalytic oxidation reaction in the presence of the catalyst.

USE - Used in vapor phase catalytic oxidation, to produce unsaturated carboxylic acids, such as (meth)acrylic acid, and unsaturated nitriles, such as (meth)acrylonitrile.

ADVANTAGE - The catalyst has improved oxidation/ammoxidation performance.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-D10; E10-A15B; E10-C04G1; E10-C04H; E11-E; **E31-G**  
 ; E31-K01; E31-L; E31-Q07; E35; E35-N; J04-E01; J04-E04A; N01; N02;  
 N03; N03-C; **N06-E01**; N07-C

TECH UPTX: 20030204

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Process: The catalyst precursor is calcined in two stages, first calcination under an oxidizing atmosphere, and second calcination under a non-oxidizing atmosphere.

L28 ANSWER 6 OF 7 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2002-407479 [44] WPIX

DNC C2002-114530

TI Catalyst, used in vapor phase catalytic oxidation to produce unsaturated

nitriles and unsaturated carboxylic acids, comprising a promoted mixed metal oxide having specified formula is new.

DC A41 E16 E17 J04

IN CHATURVEDI, S; GAFFNEY, A M; HAN, S; HEFFNER, M D; SONG, R

PA (ROHM) ROHM & HAAS CO; (CHAT-I) CHATURVEDI S; (GAFF-I) GAFFNEY A M;  
(HANS-I) HAN S; (HEFF-I) HEFFNER M D; (SONG-I) SONG R

CYC 33

PI EP 1192986 A1 20020403 (200244)\* EN 15 B01J023-00  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI TR

US 2002062038 A1 20020523 (200244) B01J023-10

BR 2001004337 A 20020611 (200248) B01J023-16

CN 1346701 A 20020501 (200252) B01J023-24

JP 2002159858 A 20020604 (200252) 15 B01J027-057

KR 2002030011 A 20020422 (200269) B01J023-63

MX 2001009743 A1 20020501 (200368) B01J023-00

US 2003204111 A1 20031030 (200372) C07C051-16

US 6734136 B2 20040511 (200431) B01J027-057

US 6790988 B2 20040914 (200460) C07C051-16

TW 592801 A 20040621 (200506) B01J023-00

ADT EP 1192986 A1 EP 2001-308128 20010925; US 2002062038 A1 Provisional US  
2000-235980P 20000928, Provisional US 2000-235981P 20000928, Provisional  
US 2000-236143P 20000929, US 2001-927288 20010810; BR 2001004337 A BR  
2001-4337 20010927; CN 1346701 A CN 2001-140943 20010927; JP 2002159858 A  
JP 2001-299122 20010928; KR 2002030011 A KR 2001-58664 20010921; MX  
2001009743 A1 MX 2001-9743 20010927; US 2003204111 A1 Provisional US  
2000-235980P 20000928, Provisional US 2000-235981P 20000928, Provisional  
US 2000-236143P 20000929, Div ex US 2001-927288 20010810, US 2003-430599  
20030507; US 6734136 B2 Provisional US 2000-235980P 20000928, Provisional  
US 2000-235981P 20000928, Provisional US 2000-236143P 20000929, US  
2001-927288 20010810; US 6790988 B2 Provisional US 2000-235980P 20000928,  
Provisional US 2000-235981P 20000928, Provisional US 2000-236143P  
20000929, Div ex US 2001-927288 20010810, US 2003-430599 20030507; TW  
592801 A TW 2001-123902 20010927

PRAI US 2001-927288 20010810; US 2000-235980P 20000928;  
US 2000-235981P 20000928; US 2000-236143P 20000929;  
US 2003-430599 20030507

IC ICM B01J023-00; B01J023-10; B01J023-16; B01J023-24; B01J023-63;  
B01J027-057; C07C051-16

ICS B01J023-28; B01J023-46; B01J023-64; B01J023-76;  
B01J037-04; B01J037-08; C01B019-00; C01G015-00;  
C07C051-00; C07C051-215; C07C051-225; C07C057-05; C07C253-00;  
C07C253-24; C07C253-26; C07C255-08

ICA C07B061-00

AB EP 1192986 A UPAB: 20020711

NOVELTY - Catalyst comprising a promoted mixed metal oxide having  
specified formula is new.

DETAILED DESCRIPTION - Catalyst comprising a promoted mixed metal  
oxide of formula (I) is new.

AaMbNcXdIreSmfOg (I)

A = Mo or W;

M = V or Ce;

N = Te, Sb or Se;

X = Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Sb, Bi, B,

In, As, Ge, Sn, Li, Na, or K;

a = 1;

b, c, and d = 0.01 - 1.0;

e and f = 0 or 0.001 - 0.1; and

g = dependent on the oxidation state of the other elements.

With the proviso that e and f cannot simultaneously be 0.

INDEPENDENT CLAIMS are included for (i) the production of unsaturated carboxylic acids, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture, in the presence of the catalyst; and (ii) the production of unsaturated nitriles, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture and ammonia, in the presence of the catalyst.

USE - Used to produce unsaturated nitriles, such as acrylonitrile and methacrylonitrile, which are important intermediates for the preparation of fibers, synthetic resins, synthetic rubber etc. The catalyst is also used to produce unsaturated carboxylic acids, such as acrylic acid and methacrylic acid, which are important intermediates for the preparation of synthetic resins, coating materials, and plasticizers.

ADVANTAGE - The catalysts have enhanced activity and selectivity, leading to a improvement in the yield of the desired reaction product.

Dwg.0/0

FS

CPI

FA

AB; DCN

MC

CPI: A01-D04; A01-D08; E10-A15B; E10-C04G; E10-C04H; **E31-G**;  
E31-L; **E31-M**; E31-Q08; E35; J04-E01; J04-E04; N01; N02;  
N03; N04-A; N07-C

TECH

UPTX: 20020711

TECHNOLOGY FOCUS - POLYMERS - Preferred Process: The catalyst is prepared by admixing compounds of the elements and at least one solvent; removing the solvent from the admixture to obtain a catalyst precursor; and calcinating the catalyst precursor.

ABEX

UPTX: 20020711

DEFINITIONS - Preferred Definitions:

A = Mo;  
N = Te;  
M = V;  
N = Te and/or Sb;  
X = Nb;  
e = 0; and  
f = 0.

L28 ANSWER 7 OF 7 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2002-407477 [44] WPIX

DNC C2002-114528

TI Catalyst, used in vapor phase catalytic oxidation to produce unsaturated nitriles and unsaturated carboxylic acids, comprising a promoted mixed metal oxide having specified formula is new.

DC A41 E16 E17 J04

IN CHATURVEDI, S; GAFFNEY, A M; HAN, S; LE, D H N; NHU LE, D H

PA (ROHM) ROHM & HAAS CO; (CHAT-I) CHATURVEDI S; (GAFF-I) GAFFNEY A M;  
(HANS-I) HAN S; (LEDH-I) LE D H N; (LEDH-I) NHU LE D H

CYC 32

PI EP 1192982 A1 20020403 (200244)\* EN 19 B01J023-00

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI TR

BR 2001004321 A 20020604 (200246) B01J023-16

US 2002072629 A1 20020613 (200246) C07C051-16

JP 2002159857 A 20020604 (200252) 19 B01J027-057

CN 1347755 A 20020508 (200253) B01J023-24

KR 2002025714 A 20020404 (200266) B01J023-64

US 6589907 B2 20030708 (200353) B01J023-00

US 2003191336 A1 20031009 (200367) C07C253-26

US 6700015 B2 20040302 (200417) C07C027-10

TW 592808 A 20040621 (200506) B01J023-64

ADT EP 1192982 A1 EP 2001-308114 20010925; BR 2001004321 A BR 2001-4321  
20010927; US 2002072629 A1 Provisional US 2000-235978P 20000928,

Provisional US 2000-236129P 20000928, Provisional US 2000-236260P 20000928, US 2001-928019 20010810; JP 2002159857 A JP 2001-297738 20010927; CN 1347755 A CN 2001-140931 20010927; KR 2002025714 A KR 2001-58680 20010921; US 6589907 B2 Provisional US 2000-235978P 20000928, Provisional US 2000-236129P 20000928, Provisional US 2000-236260P 20000928, US 2001-928019 20010810; US 2003191336 A1 Provisional US 2000-235978P 20000928, Provisional US 2000-236129P 20000928, Provisional US 2000-236260P 20000928, Div ex US 2001-928019 20010810, US 2003-430194 20030506; US 6700015 B2 Provisional US 2000-235978P 20000928, Provisional US 2000-236129P 20000928, Provisional US 2000-236260P 20000928, Div ex US 2001-928019 20010810, US 2003-430194 20030506; TW 592808 A TW 2001-123930 20010927

FDT US 2003191336 A1 Div ex US 6589907; US 6700015 B2 Div ex US 6589907

PRAI US 2001-928019 20010810; US 2000-235978P 20000928;  
US 2000-236129P 20000928; US 2000-236260P 20000928;  
US 2003-430194 20030506

IC ICM B01J023-00; B01J023-16; B01J023-24; B01J023-64; B01J027-057;  
C07C027-10; C07C051-16; C07C253-26

ICS B01J021-08; B01J023-06; B01J023-08; **B01J023-28**; B01J023-54;  
B01J023-76; **B01J037-04**; **B01J037-08**; C01B019-00;  
C01G015-00; C07C051-00; C07C051-21; C07C051-215; C07C057-05;  
C07C253-00; C07C253-18; C07C253-24; C07C255-08

ICA C07B061-00

AB EP 1192982 A UPAB: 20020711

NOVELTY - Catalyst comprising a promoted mixed metal oxide having specified formula is new.

DETAILED DESCRIPTION - Catalyst comprising a promoted mixed metal oxide of formula (I) is new.

$AaMbNcXdZneGaOf$  (I)

A = Mo or W;

M = V or Ce;

N = Te, Sb or Se;

X = Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Sb, Bi, B, In, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb or Lu;

a = 1;

b, c, and d = 0.01 - 1.0;

e and f = 0 or 0.001 - 0.1; and

g = dependent on the oxidation state of the other elements.

With the proviso that e and f cannot simultaneously be 0.

INDEPENDENT CLAIMS are included for (i) the production of unsaturated carboxylic acids, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture, in the presence of the catalyst; and (ii) the production of unsaturated nitriles, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture and ammonia, in the presence of the catalyst.

USE - Used in vapor phase catalytic oxidation to produce unsaturated nitriles, such as acrylonitrile and methacrylonitrile, which are important intermediates for the preparation of fibers, synthetic resins, synthetic rubber etc. The catalyst is also used to produce unsaturated carboxylic acids, such as acrylic acid and methacrylic acid, which are important intermediates for the preparation of synthetic resins, coating materials, and plasticizers.

ADVANTAGE - The catalysts have enhanced activity and selectivity, leading to a improvement in the yield of the desired reaction product.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-D08; E10-A15B; E10-C04H; **E31-G**; E31-K01;  
E31-L; **E31-M**; E31-Q08; E35; J04-E04A; N01; N02; N03; N04-A;



N04-B; N07-C

TECH UPTX: 20020711

TECHNOLOGY FOCUS - POLYMERS - Preferred Process: The catalyst is prepared by admixing compounds of the elements and at least one solvent; removing the solvent from the admixture to obtain a catalyst precursor; and calcinating the catalyst precursor.

ABEX UPTX: 20020711

DEFINITIONS - Preferred Definitions:

A = Mo;  
 N = Te;  
 M = V;  
 N = Te and/or Sb;  
 X = Nb;  
 e = 0; and  
 f = 0.

=&gt; =&gt; d all abeq tech abex 126

L26 ANSWER 1 OF 1 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2004-363753 [34] WPIX

DNC C2004-137252

TI Catalyst for the production of unsaturated carboxylic acid or unsaturated nitrile by vapor phase oxidation, contains mixed metal oxide of tellurium or antimony.

DC A41 E19 F01 J04

IN GAFFNEY, A M; SONG, R

PA (ROHM) ROHM &amp; HAAS CO; (GAFF-I) GAFFNEY A M; (SONG-I) SONG R

CYC 36

PI US 2004063990 A1 20040401 (200434)\* 21 B01J027-128

EP 1407819 A2 20040414 (200434) EN B01J023-28 &lt;--

R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV  
 MC MK NL PT RO SE SI SK TR

JP 2004148302 A 20040527 (200441) 32 B01J027-057

CN 1491745 A 20040428 (200446) B01J027-057

KR 2004030364 A 20040409 (200453) B01J027-02

BR 2003004188 A 20040831 (200460) B01J027-057

ADT US 2004063990 A1 Provisional US 2002-415288P 20021001, US 2003-676884

20030930; EP 1407819 A2 EP 2003-255811 20030917; JP 2004148302 A JP

2003-340313 20030930; CN 1491745 A CN 2003-159449 20030925; KR 2004030364

A KR 2003-68337 20031001; BR 2003004188 A BR 2003-4188 20030922

PRAI US 2002-415288P 20021001; US 2003-676884 20030930

IC ICM B01J023-28; B01J027-02; B01J027-057; B01J027-128

ICS B01J023-34; B01J023-652; B01J023-887; B01J027-06; B01J027-125;

B01J027-13; B01J027-132; B01J027-135; B01J027-14; B01J027-186;

B01J027-187; B01J027-188; B01J027-19; B01J027-192; B01J027-198;

B01J027-199; B01J035-00; B01J037-00; B01J037-04;

B01J037-08; B01J037-10; C07C051-215; C07C057-04;

C07C057-05; C07C067-05; C07C253-18; C07C253-24

AB US2004063990 A UPAB: 20040527

NOVELTY - A catalyst contains a mixed metal oxide (I) of tellurium or antimony.

DETAILED DESCRIPTION - A catalyst comprises a mixed metal oxide of formula (I).

MOaVbMcNbdXeOf (I)

M = Te or Sb;

X = Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, Sc, Y, La, Ti, Zr, Hf, Ta,  
 Cr, W, Mn, Re, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, B, Ga, In,  
 Pb, P, As, Sb, Bi, Se, F, Cl, Br, I, Pr, Nd, Sm or Tb.

When M is Sb, X cannot be Sb. a, b, c, d, e and f are the relative

atomic amounts of the elements Mo, V, M, Nb, X or O respectively; and when  $a = 1$ ,  $b = 0.01-1$ ,  $c = 0.01-1$ ,  $d = 0.01-1$ ,  $e$  is greater than 0 but at most 1 and  $f$  is dependent on the oxidation state of the other elements.

An INDEPENDENT CLAIM is also included for a process for producing a catalyst comprising a mixed metal oxide, comprising mixing compounds of molybdenum (Mo), vanadium (V), M, niobium (Nb), or X, as needed, and a solvent comprising water to form a first mixture containing at least 2 but less than all of the elements Mo, V, M, Nb and X. The first mixture is heated at 25-200 deg. C for 5 minutes to 48 hours. Compounds of Mo, V, M, Nb and X, as needed, are mixed with the first mixture to form a second mixture containing elements Mo, V, M, Nb and X, in the respective relative atomic proportions  $a$ ,  $b$ ,  $c$ ,  $d$  and  $e$ , such that when  $a = 1$ ,  $b = 0.01-1$ ,  $c = 0.01-1$ ,  $d = 0.01-1$  and  $e$  is greater than 0 but at most 1. The second mixture is heated at 50-300 deg. C for 1 hour to several weeks, in a closed vessel under pressure. An insoluble material is recovered from the closed vessel to obtain a catalyst.

USE - The catalyst is used for the production of an unsaturated carboxylic acid by the vapor phase oxidation of an alkane or a mixture of an alkane and an alkene; or the production of an unsaturated nitrile by the vapor phase oxidation of an alkane, or a mixture of an alkane and an alkene, and ammonia (claimed). (Meth)acrylonitrile is used in the production of fibers, resins and rubbers.

ADVANTAGE - The catalyst exhibits good catalytic activities.

Dwg.0/4

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-D08; E10-A15B; E10-C04G1; E10-C04H; E11-E; E11-F07; E31-G; E31-K05B; E31-M; E31-Q07; E35; F01-D02; J04-E04A; N01; N02; N03; N06-E01; N07-C; N07-D08

TECH UPTX: 20040527

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Method: The recovered insoluble material is calcined.

ABEX UPTX: 20040527

EXAMPLE - To a 125 ml Parr Acid Digestion Bomb with an inner tube made of polytetrafluoroethylene, 3.15 g tellurium dioxide and 60 ml of 0.143 M ammonium heptamolybdate tetrahydrate in water were added. The mixture was first hydrothermally treated at 100degreesC for 1.5 hours, and then 6 ml of 0.1 M palladium nitrate hydrate in water and 6.5 g vanadyl sulfate hydrate were added to the bomb at 60degreesC followed by 30 ml aqueous solution (0.2 M in Nb) of ammonium niobium oxalate with stirring. The bomb contents were hydrothermally treated at 175degreesC for 4 days. Black solids formed in the bomb were collected by gravity filtration, washed with deionized water (50 ml), dried in a vacuum oven at 25degreesC overnight, and then calcined in air from 25-275degreesC at 10degreesC/minutes and held at 275degreesC for 1 hour, then in argon from 275-600degreesC at 2degreesC/minutes and held at 600degreesC for 2 hours. The final catalyst had a nominal composition of  $\text{Pd}0.01\text{Mo}1\text{V}0.43\text{Te}0.33\text{Nb}0.10\text{X}$ . It was pressed and sieved to 14-20 mesh granules for reactor evaluation.

=> d all abeq tech abex tot 129

L29 ANSWER 1 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2004-272549 [26] WPIX

DNC C2004-105881

TI Manufacture of oxide catalyst for gaseous phase oxidation or ammoxidation of propane or isobutane, involves preparing raw material liquid at preset non-stirring time.

DC A41 E19 J04

PA (ASAH) ASahi KASEI KK

CYC 1

PI JP 2003210982 A 20030729 (200426)\* 7 B01J023-28 &lt;--

ADT JP 2003210982 A JP 2002-13251 20020122

PRAI JP 2002-13251 20020122

IC ICM B01J023-28

ICS B01J037-04; C07C051-215; C07C057-05; C07C253-24; C07C255-08

ICA C07B061-00

AB JP2003210982 A UPAB: 20040421

NOVELTY - A raw material is prepared, dried and baked to obtain an oxide catalyst. Non-stirring time with respect to the raw material liquid obtained in raw material preparation process is set to less than 1 hour.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) an oxide catalyst; and

(2) the manufacture of unsaturated acid or unsaturated nitrile which involves subjecting propane or isobutane to oxidation or ammoxidation in the gaseous phase, using the oxide catalyst.

USE - The oxide catalyst is used for gaseous phase catalytic oxidation or catalytic ammoxidation of propane or isobutane to obtain unsaturated acid or unsaturated nitrile (claimed).

ADVANTAGE - An oxide catalyst with small reduction in property is manufactured with favorable reproducibility and in large quantities.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D00D; E10-A15B; E10-C04G1; E11-E; E11-F07; E31-G;

E31-M; E35-N; E35-Q; J04-E04; N03-C01; N03-C03;

N03-D02; N03-H; N04-A; N06-E01; N07-C01; N07-D08

TECH UPTX: 20040421

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Condition: Non-stirring time with respect to raw material liquid obtained in raw material preparation is set to less than 20 minutes.

Preferred Catalyst: The oxide catalyst is of formula (I):

$$\text{Mo}_1\text{V}_a\text{Nb}_b\text{X}_c\text{O}_n \quad (\text{I})$$

X = tellurium and/or antimony, preferably antimony;

a, b, c = 0.01-1; and

n = number decided by the valency of the structure metal.

The catalyst is prepared from a raw material liquid contains niobium. The niobium-containing raw material contains dicarboxylic acid and a niobium compound in a molar ratio of 1-4. The catalyst is supported on silica. The amount of silica in the catalyst is 20-60 wt.%.

ABEX UPTX: 20040421

EXAMPLE - Ammonium heptamolybdate (in g) (448.3), ammonium metavanadate (65.36) and antimony trioxide (77.72) were added to water (2353) and nitrogen gas was circulated. Compounds were stirred and heated at 90 degreesC to obtain a liquid mixture (I). 30 weight% hydrogen peroxide solution of hydrogen peroxide (92.12), and antimony trioxide (22.21) were added to niobium containing liquid (398) and stirred and mixed at room temperature for 1 hour to obtain a liquid mixture (II). The liquid mixture (I) was cooled to 70 degreesC, and silica sol (30.6 weight%) containing silica (1471) was added. 30 weight% hydrogen peroxide solution containing hydrogen peroxide (90.68) was added and stirred at 47 degreesC for 1 hour. The liquid mixture (II) was added and stirring was continued for 20 minutes to obtain a raw material liquid. The raw material liquid was dried to obtain dry microsphere like powder. The dry powder was baked to obtain an oxide catalyst. The catalyst (45) was filled in a reaction tube and mixed gas of propane, ammonia, oxygen and helium in a molar ratio of 1:0.6:1.5:5.6 was supplied. Propane was subjected to ammoxidation at 440 degreesC and normal pressure to obtain acrylonitrile. Propane conversion

ratio was 50.5 mol% and acrylonitrile selectivity was 66.5 mol%.

L29 ANSWER 2 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN  
 AN 2004-228451 [22] WPIX  
 DNC C2004-089880  
 TI Production of lactones by catalytic carbonylation of oxiranes comprises use of a catalyst system comprising a carbonylation catalyst of a neutral or anionic complex of a Group 5-11 transition metal element and a Lewis acid.  
 DC A41 E13 J04  
 IN ALLMENDINGER, M; LUINSTRA, G; RIEGER, B  
 PA (BADI) BASF AG  
 CYC 28  
 PI DE 10235316 A1 20040212 (200422)\* 8 C07D303-02  
 WO 2004012861 A1 20040212 (200422) GE B01J031-22  
 RW: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO  
 SE SI SK TR  
 W: JP US  
 ADT DE 10235316 A1 DE 2002-10235316 20020801; WO 2004012861 A1 WO 2003-EP8478 20030731  
 PRAI DE 2002-10235316 20020801  
 IC ICM B01J031-22; C07D303-02  
 ICS B01J031-12; B01J037-04; C07D305-12; C07F015-06  
 AB DE 10235316 A UPAB: 20040331  
 NOVELTY - A process for the production of lactones by catalytic carbonylation of oxiranes comprises use of a catalyst system comprising at least one carbonylation catalyst of a neutral or anionic complex of a Group 5-11 transition metal element and at least one Lewis acid with the exception of ((salph)Al(THF<sub>2</sub>))(Co(CO)<sub>4</sub>).  
 DETAILED DESCRIPTION - A process for the production of lactones by catalytic carbonylation of oxiranes comprises use of a catalyst system (I) comprising (A) at least one carbonylation catalyst of a neutral or anionic complex of a Group 5-11 transition metal element and (B) at least one Lewis acid with the exception of ((salph)Al(THF<sub>2</sub>))(Co(CO)<sub>4</sub>).  
 INDEPENDENT CLAIMS are included for:  
 (1) the catalyst system (I) and;  
 (2) a process for the preparation of the catalyst system (I) by mixing components (A) and (B).  
 USE - The catalyst (I) is useful for carbonylation reactions (claimed).  
 ADVANTAGE - The process is cost effective and efficient and results in an optically enriched beta -lactone product.  
 Dwg.0/0  
 FS CPI  
 FA AB; DCN  
 MC CPI: A01-E12; E05-A; E05-B; E05-D; E05-F; E05-G; E05-H; E05-J;  
 E05-L; E05-L02B; E05-L03A; E05-M; E05-N; E07-A02C;  
 E07-A02G; E07-A03C; E07-H; E31-N05B; J04-E04; N01; N02; N03; N04-A;  
 N05-B; N05-C  
 TECH UPTX: 20040331  
 TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Process: The lactone is a mixture of S- and R-enantiomers with one being in excess. Component (A) has neutral ligands and is of formula (1). (Man<sup>+</sup>)<sub>m</sub>(Mb(L)<sub>4</sub>)<sub>2</sub> (1)  
 Mb = Group 8-10 transition metal with a formal charge of -1 ;  
 L = PR<sub>3</sub>, P(OR)<sub>3</sub>, NR<sub>3</sub>, SR<sub>2</sub>, OR<sub>2</sub>, CO, RCN, RNO<sub>2</sub>, (RO)(R<sub>1</sub>O)C=O, 9R)(R<sub>1</sub>)C=O or (R)C=O(OR<sub>1</sub>);  
 Ma = Group 1 or 2 element, Zn, Hg bis(triarylphosphine)iminium, trityl or T(R)<sub>4</sub>;  
 T = N, P or As;  
 R, R<sub>1</sub> = H, alkyl, aryl, alkanyl or aralkyl;

m, n = 1 or 2;

l = n x m

Component (A) contains cobalt. The chiral Lewis acid (B) is a Group 2-13 element which is coordinatively unsaturated.

ABEX

UPTX: 20040331

EXAMPLE - A chromium-salen complex (124.2 mg, (1R, 2R)-(-)-(1,2-cyclohexandiamino-N,N'-bis(3,5-di-t-butylsalicyliden))chromium (III)) was added to a mixture of Na(CoCO<sub>4</sub>) (0.39 mmol) in rac-propylene oxide under ice cooling and in an argon atmosphere prior to addition to an autoclave (100 ml) and pressurizing to 60-65 bar CO. The autoclave was depressurized and cooled. The yield of beta-butyrolactone was around 25% with an enantiomeric excess of the S- isomer of about 8%. In comparison use of an aluminum salen complex resulted in a 11% yield of beta-butyrolactone with no enantiomeric excess.

L29 ANSWER 3 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2004-147100 [15] WPIX

DNC C2004-059223

TI Manufacture of oxide catalyst used for oxidation of propane, involves specifying residence time of raw material liquid in longest pipe in which liquid circulates during preparation and/or drying process, to preset value.

DC A41 E19 H04 J04

PA (ASAH) ASahi KASEI KK

CYC 1

PI JP 2003181287 A 20030702 (200415)\* 7 B01J023-28 <--

ADT JP 2003181287 A JP 2001-379626 20011213

PRAI JP 2001-379626 20011213

IC ICM B01J023-28

ICS B01J037-00; B01J037-04; C07B061-00; C07C051-215;  
C07C051-25; C07C253-24; C07C253-26

AB JP2003181287 A UPAB: 20040302

NOVELTY - A raw material liquid is prepared, dried and baked to form oxide catalyst. The residence time of raw material liquid in the longest pipe in which raw material liquid circulates during preparation process and/or drying process, is 3 seconds to 1 hour.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(1) oxide catalyst; and

(2) manufacture of unsaturated acid or unsaturated nitrile involves performing gas phase catalytic oxidation or gas phase contact ammoxidation of propane or isobutylene in the presence of the oxide catalyst.

USE - For manufacturing oxide catalyst used for gas-phase catalytic oxidation or gas-phase contact ammoxidation of propane, isobutylene or propylene for manufacturing unsaturated acid or unsaturated nitrile (all claimed).

ADVANTAGE - The gelatinization of raw material liquid during manufacture of oxide catalyst is suppressed. Manufacture of oxide catalyst with high productivity is enabled. The oxide catalyst has high selectivity with respect to unsaturated acid or unsaturated nitrile.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-D08; E10-A15B; E10-C04G1; E10-C04H; E11-E; E31-G;  
; E31-M; H04-E; H04-F01; H04-F02E; J04-E01; J04-E04A;  
N03-C03; N03-D02; N03-H; N04-A; N06-E01; N07-C

TECH

UPTX: 20040302

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Process: The residence time in the longest piping is 3 seconds to 20 minutes. The drying process is a spray-drying method. Preferred Catalyst: The raw material liquid

contains niobium, and is obtained from dicarboxylic acid and niobium compound. The molar ratio of dicarboxylic acid and niobium in the catalyst is 1-4. The oxide catalyst is of formula,  $MolVaNbXcOn$ , where X is tellurium and/or antimony, preferably antimony, a, b and c are 0.01-1, and n is valency of metal. The oxide catalyst is supported by silica. The content of silica is 20-60 wt.% with respect to total weight of catalyst and silica.

ABEX UPTX: 20040302

EXAMPLE - Niobic acid (in g) (795.1) and oxalic acid dihydrate (3120) were mixed with water (5640). The liquid mixture was heated at 95degreesC for 1 hour and the aqueous solution was separated by filtration. The obtained niobium-containing liquid had oxalic acid to niobium molar ratio of 2.395. Water (2323), ammonium heptamolybdate (442.7), ammonium metavanadate (64.53) and antimony trioxide (80.39) were mixed in a container under nitrogen gas atmosphere. The mixture was heated at 90degreesC for 2 hours to form a liquid mixture (A). Hydrogen peroxide solution (96.63) containing 30 weight% hydrogen peroxide was added to obtained niobium-containing liquid (431.6). Further, antimony trioxide (21.92) was added and stirred at room temperature to form liquid mixture (B). The solution (A) was cooled to 70degreesC. Silica sol (1471) containing silica (30.6 weight%) was added. Further, hydrogen peroxide solution (125.1) was added and stirred at 45degreesC for 1 hour. Then, liquid mixture (B) was added to form a raw material liquid. The residence time of the raw material liquid in the longest pipe was 2 minutes and 45 seconds. The solution was supplied to centrifugation type spray-drier. The solution was dried to obtain powder which was baked in a stainless steel pipe at 640degreesC for 2 hours. Catalyst oxide particle was obtained. Oxide catalyst (45) was filled in a Vycor glass fluid bed type reaction tube. A mixed gas of propane, ammonia, oxygen and helium in a molar ratio of 1:0.6:1.5:5.6 was supplied to the tube. The reaction was performed at 440degreesC and at normal pressure. The conversion ratio of propane was 50.5% and selectivity of acrylonitrile was 66.7%.

L29 ANSWER 4 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2003-724066 [69] WPIX

CR 2002-115960 [16]

DNC C2003-199410

TI Catalyst for selective preparation of unsaturated nitriles from corresponding olefins, comprises mixed oxide containing bismuth, molybdenum, vanadium, antimony and niobium.

DC A41 E16 J04

PA (ABDU-I) ABDULWAHED M; (YAHY-I) YAHYAOUI K E

CYC 1

PI JP 2001259420 A 20010925 (200369)\* 30 B01J023-31

ADT JP 2001259420 A JP 2001-69672 20010313

PRAI US 2000-189215P 20000314

IC ICM B01J023-31

ICS B01J037-04; C07C253-24; C07C255-08

ICA C07B061-00

AB JP2001259420 A UPAB: 20031027

NOVELTY - A catalyst for selective preparation of unsaturated nitriles from corresponding olefins, comprises mixed oxide containing bismuth, molybdenum, vanadium, antimony and niobium, and optionally at least one element selected from groups VB, VIB, VIIB, and VIII, and at least one alkali promoter selected from groups IA and IIA

DETAILED DESCRIPTION - A catalyst has an atomic ratio shown by specific empirical formula of  $BiaMobVcSbdNbeAfBgOx$ .

A = at least one element selected from groups VB, VIB, VIIB, and VIII;

B = at least one alkali promoter selected from groups IA and IIA;

a = 0.01-12;  
 b = 0.01-12;  
 c = 0.01-2;  
 d = 0.01-10;  
 e = 0.01-1;  
 f = 0-2;  
 g = 0-1; and

x = number of oxygen atoms required to satisfy the valency requirements of the elements present.

An INDEPENDENT CLAIM is included for a method for preparing the catalyst for olefin ammoxidation, comprising:

(a) preparing a vanadium antimonate phase by heating a slurry of vanadium oxide and antimony oxide to form a vanadium-antimony paste and subsequently drying the paste and calcining to form the vanadium antimonate phase;

(b) preparing a niobium-molybdenum solution;

(c) preparing bismuth, niobium, and molybdenum mixed oxide hydrates at room temperature and without heat treating the mixed oxide hydrates;

(d) combining the vanadium antimonate phase, the mixed oxide hydrates and a support thereby forming a catalyst precursor mixture;

(e) stirring the catalyst precursor mixture for a period of time sufficient to form a catalyst precursor paste; and

(f) drying the catalyst precursor paste to form a dried catalyst precursor material and calcining the dried catalyst precursor material to form the catalyst.

USE - For selective preparation of unsaturated nitriles from corresponding olefins.

ADVANTAGE - The catalyst for selective preparation of unsaturated nitriles from corresponding olefins, has high activity.

Dwg.1/1

FS CPI

FA AB; GI; DCN

MC CPI: A01-D04; E10-A15B; **E31-M**; J04-E04A; N03-C01; N03-C03;

**N03-D02**; N03-H; **N06-E01**

TECH UPTX: 20031027

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Method: The vanadium oxide is V2O5.

The antimony oxide is Sb2O3.

The calcining in step (a) is at most preferably 750 degreesC, in the presence of air.

The niobium-molybdenum solution is prepared at a pH of most preferably 3.5-5.

Step (c) comprises adding bismuth to the niobium-molybdenum solution and precipitating the mixed oxide hydrates at room temperature and without heat treating of the mixed oxide hydrates.

Step (c) comprises rash co-precipitation of bismuth, niobium, and molybdenum mixed oxide hydrates.

Step (c) comprises adding a solution containing bismuth to the niobium-molybdenum solution.

Step (d) comprises incorporating the vanadium antimonate phase and the mixed oxide hydrates in pre-acidified silica colloidal.

The method further comprises boiling the catalyst precursor mixture to form the catalyst precursor paste.

The stirring in step (e) is vigorous stirring.

The catalyst precursor paste is dried at most preferably about 120 degreesC

The calcining of the dried catalyst precursor material is at most preferably about 550 degreesC, in the presence of air.

The the support is selected from silica, alumina, zirconia, titania, alumina, silicon carbide, alumina-silica, inorganic phosphates, silicates,

aluminates, borates and carbonates, pumice, montmorillonite, or mixtures thereof.

The support is pre-acidified silica.

The catalyst comprises 40-70 weight% of the support.

The catalyst contains niobium derived from niobium pentoxide, or from a niobium source soluble in water.

The niobium-molybdenum solution is prepared using niobium derived from niobium pentoxide.

Step (a) comprises drying the paste at most preferably about 120 degreesC.

ABEX UPTX: 20031027

DEFINITIONS - Preferred Definitions:

f = 0.01-1;

g = 0.001-0.5.

L29 ANSWER 5 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2002-407480 [44] WPIX

DNC C2002-114531

TI Catalyst, used in vapor phase catalytic oxidation to produce unsaturated nitriles and unsaturated carboxylic acids, comprising a promoted mixed metal oxide having specified formula is new.

DC A41 E16 E17 J04

IN CHATURVEDI, S; GAFFNEY, A M; HAN, S; HEFFNER, M D; LE, D H N; SONG, R; VICKERY, E M; NHU LE, D H

PA (ROHM) ROHM & HAAS CO; (CHAT-I) CHATURVEDI S; (GAFF-I) GAFFNEY A M; (HANS-I) HAN S; (HEFF-I) HEFFNER M D; (LEDH-I) NHU LE D H; (SONG-I) SONG R; (VICK-I) VICKERY E M

CYC 32

PI EP 1192987 A1 20020403 (200244)\* EN 21 B01J023-00  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI TR

BR 2001004285 A 20020507 (200244) B01J023-16

US 6407280 B1 20020618 (200244) B01J023-64

US 2002065431 A1 20020530 (200244) C07C051-16

CN 1347756 A 20020508 (200253) B01J023-24

JP 2002177784 A 20020625 (200256) 21 B01J027-057

KR 2002030013 A 20020422 (200269) B01J023-64

US 6504053 B1 20030107 (200306) C07C051-16

MX 2001009742 A1 20020501 (200368) B01J023-00

ADT EP 1192987 A1 EP 2001-308131 20010925; BR 2001004285 A BR 2001-4285  
20010927; US 6407280 B1 Provisional US 2000-235979P 20000928, Provisional  
US 2000-235984P 20000928, Provisional US 2000-236000P 20000928,  
Provisional US 2000-236130P 20000928, Provisional US 2001-286219P  
20010425, US 2001-928197 20010810; US 2002065431 A1 Provisional US  
2000-235979P 20000928, Provisional US 2000-235984P 20000928, Provisional  
US 2000-236000P 20000928, Provisional US 2000-236130P 20000928,  
Provisional US 2001-286219P 20010425, US 2001-928197 20010810; CN 1347756  
A CN 2001-140941 20010927; JP 2002177784 A JP 2001-300840 20010928; KR  
2002030013 A KR 2001-58666 20010921; US 6504053 B1 Provisional US  
2000-235979P 20000928, Provisional US 2000-235984P 20000928, Provisional  
US 2000-236000P 20000928, Provisional US 2000-236130P 20000928,  
Provisional US 2001-286219P 20010425, Div ex US 2001-928197 20010810, US  
2002-144924 20020514; MX 2001009742 A1 MX 2001-9742 20010927

FDT US 6504053 B1 Div ex US 6407280

PRAI US 2001-928197 20010810; US 2000-235979P 20000928;

US 2000-235984P 20000928; US 2000-236000P 20000928;

US 2000-236130P 20000928; US 2001-286219P 20010425;

US 2002-144924 20020514

IC ICM B01J023-00; B01J023-16; B01J023-24; B01J023-64; B01J027-057;  
C07C051-16

ICS B01J021-12; B01J021-14; B01J023-28; B01J023-48; B01J023-54;



B01J023-76; B01J037-04; C07C051-00; C07C051-215;  
 C07C051-25; C07C057-05; C07C253-00; C07C253-18; C07C253-24;  
 C07C253-26; C07C255-08

ICA C07B061-00

AB EP 1192987 A UPAB: 20020711

NOVELTY - Catalyst comprising a promoted mixed metal oxide having specified formula is new.

DETAILED DESCRIPTION - Catalyst comprising a promoted mixed metal oxide of formula (I) is new.

AaMbNcXdZeOf (I)

A = Mo or W;

M = V or Ce;

N = Te, Sb or Se;

X = Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Sb, Bi, B, In, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb or Lu;

Z = Ni, Pd, Cu, Ag or Au;

a = 1;

b, c and d = 0.01 to 1.0;

e = 0.001 to 0.1; and

f = dependent on the oxidation state of the other elements.

INDEPENDENT CLAIMS are included for (i) the production of unsaturated carboxylic acids, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture, in the presence of the catalyst; and (ii) the production of unsaturated nitriles, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture and ammonia, in the presence of the catalyst.

USE - Used to produce unsaturated nitriles, such as acrylonitrile and methacrylonitrile, which are important intermediates for the preparation of fibers, synthetic resins, synthetic rubber etc. The catalyst is also used to produce unsaturated carboxylic acids, such as acrylic acid and methacrylic acid, which are important intermediates for the preparation of synthetic resins, coating materials, and plasticizers.

ADVANTAGE - The catalysts have enhanced activity and selectivity, leading to a improvement in the yield of the desired reaction product.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-D08; E10-A15B; E10-C04G; E10-C04H; E31-G;  
 E31-K01; E31-L; E31-M; E31-Q08; E35; J04-E01; J04-E04; N01;  
 N02; N03; N04-A; N04-B; N07-C

TECH UPTX: 20020711

TECHNOLOGY FOCUS - POLYMERS - Preferred Process: The catalyst is prepared by admixing compounds of the elements and at least one solvent; removing the solvent from the admixture to obtain a catalyst precursor; and calcinating the catalyst precursor.

ABEX UPTX: 20020711

DEFINITIONS - Preferred Definitions:

M = V;

N = Te and/or Sb;

X = Nb;

A = Mo;

N = Te; and

at least one of A, M, N, X and Z I = an oxygen-containing compound.

L29 ANSWER 6 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2002-407478 [44] WPIX

DNC C2002-114529

TI Catalyst, used in vapor phase catalytic oxidation to produce unsaturated nitriles and unsaturated carboxylic acids, comprising a promoted mixed

metal oxide having specified formula is new.

DC A41 E16 E17 J04

IN CHATURVEDI, S; GAFFNEY, A M; HAN, S; HEFFNER, M D; SONG, R; HEFENER, M D; BARRETT, G; DAVIS, D

PA (ROHM) ROHM & HAAS CO; (CHAT-I) CHATURVEDI S; (GAFF-I) GAFFNEY A M; (HANS-I) HAN S; (HEFF-I) HEFFNER M D; (SONG-I) SONG R; (HEFE-I) HEFENER M D; (BARR-I) BARRETT G; (DAVI-I) DAVIS D

CYC 32

PI EP 1192984 A1 20020403 (200244)\* EN 16 B01J023-00  
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI TR

US 2002058835 A1 20020516 (200244) B01J021-08

BR 2001004319 A 20020604 (200246) B01J023-16

CN 1346699 A 20020501 (200252) B01J023-24

KR 2002030012 A 20020422 (200269) B01J023-64

US 6461996 B2 20021008 (200269) B01J023-00

US 2003018208 A1 20030123 (200310) B01J023-00

US 2003028399 A1 20030206 (200313) G06F017-60

JP 2003053190 A 20030225 (200324) 48 B01J027-132

US 2003176734 A1 20030918 (200362) C07C051-16

US 6624111 B2 20030923 (200364) B01J023-22

US 6747168 B2 20040608 (200437) C07C253-24

TW 574070 A 20040201 (200453) B01J023-16

ADT EP 1192984 A1 EP 2001-308121 20010925; US 2002058835 A1 Provisional US 2000-235977P 20000928, Provisional US 2000-236261P 20000928, Provisional US 2000-236262P 20000928, Provisional US 2000-236263P 20000928, US 2001-927941 20010810; BR 2001004319 A BR 2001-4319 20010927; CN 1346699 A CN 2001-140930 20010927; KR 2002030012 A KR 2001-58665 20010921; US 6461996 B2 Provisional US 2000-235977P 20000928, Provisional US 2000-236261P 20000928, Provisional US 2000-236262P 20000928, Provisional US 2000-236263P 20000928, US 2001-927941 20010810; US 2003018208 A1 Provisional US 2000-235977P 20000928, Provisional US 2000-236261P 20000928, Provisional US 2000-236262P 20000928, Provisional US 2000-236263P 20000928, Div ex US 2001-927941 20010810, US 2002-225709 20020822; US 2003028399 A1 Provisional US 2000-235977P 20000928, US 2001-963099 20010924; JP 2003053190 A JP 2001-315888 20011012; US 2003176734 A1 Provisional US 2000-235977P 20000928, Provisional US 2000-236261P 20000928, Provisional US 2000-236262P 20000928, Provisional US 2000-236263P 20000928, Div ex US 2001-927941 20010810, Div ex US 2002-225709 20020822, US 2003-444599 20030522; US 6624111 B2 Provisional US 2000-235977P 20000928, Provisional US 2000-236261P 20000928, Provisional US 2000-236262P 20000928, Provisional US 2000-236263P 20000928, Div ex US 2001-927941 20010810, Div ex US 2002-225709 20020822, US 2003-444599 20030522; TW 574070 A TW 2001-123927 20010927

FDT US 2003018208 A1 Div ex US 6461996; US 2003176734 A1 Div ex US 6461996; US 6624111 B2 Div ex US 6461996; US 6747168 B2 Div ex US 6461996, Div ex US 6624111

PRAI US 2001-927941 20010810; US 2000-235977P 20000928;  
 US 2000-236261P 20000928; US 2000-236262P 20000928;  
 US 2000-236263P 20000928; US 2002-225709 20020822;  
 US 2001-963099 20010924; US 2003-444599 20030522

IC ICM B01J021-08; B01J023-00; B01J023-16; B01J023-22; B01J023-24;  
 B01J023-64; B01J027-132; C07C051-16; C07C253-24; G06F017-60

ICS B01J021-12; B01J021-14; B01J023-28; B01J023-54; B01J023-76;  
 B01J027-057; B01J037-03; B01J037-04;  
 B01J037-22; C07C051-00; C07C051-215; C07C051-25; C07C057-05;

C07C253-00; C07C253-18; C07C253-26; C07C253-28; C07C255-08

ICA C07B061-00

AB EP 1192984 A UPAB: 20030312

NOVELTY - Catalyst comprising a promoted mixed metal oxide having specified formula is new.

DETAILED DESCRIPTION - Catalyst comprising a promoted mixed metal oxide of formula (I) is new.

AaMbNcXdZeOf (I)

A = Mo or W;

M = V or Ce;

N = Te, Sb or Se;

X = Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Sb, Bi, B, In, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb or Lu;

Z = Br, Cl, F or I;

a = 1;

b, c and d = 0.01 to 1.0;

e = 0.001 to 0.1; and

f = dependent on the oxidation state of the other elements.

INDEPENDENT CLAIMS are included for (i) the production of unsaturated carboxylic acids, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture, in the presence of the catalyst; and (ii) the production of unsaturated nitriles, comprising vapor phase catalytic oxidation of an alkane or alkane/alkene mixture and ammonia, in the presence of the catalyst.

USE - Used to produce unsaturated nitriles, such as acrylonitrile and methacrylonitrile, which are important intermediates for the preparation of fibers, synthetic resins, synthetic rubber etc. The catalyst is also used to produce unsaturated carboxylic acids, such as acrylic acid and methacrylic acid, which are important intermediates for the preparation of synthetic resins, coating materials, and plasticizers.

ADVANTAGE - The catalysts have enhanced activity and selectivity, leading to a improvement in the yield of the desired reaction product.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-D08; E10-A15B; E10-C04G; E10-C04H; E31-G; E31-K01; E31-L; E31-M; E31-Q08; E35; J04-E04; N01; N02; N03; N04-A; N04-B; N07-C

TECH UPTX: 20020711

TECHNOLOGY FOCUS - POLYMERS - Preferred Process: The catalyst is prepared by admixing compounds of the elements and at least one solvent; removing the solvent from the admixture to obtain a catalyst precursor; and calcinating the catalyst precursor (optionally in the presence of a source of halogen, preferably is Br, Cl, F or I).

ABEX UPTX: 20020711

DEFINITIONS - Preferred Definitions:

M = V;

N = Te and/or Sb, preferably Te;

X = Nb; and

A = Mo.

L29 ANSWER 7 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2002-174366 [23] WPIX

DNC C2002-054155

TI Composite metal oxide catalyst for production of carboxylic acid, is obtained by calcining precursor having preset diffraction peak in specific diffraction angle according to X-ray diffraction.

DC A41 E16

PA (MITU) MITSUBISHI CHEM CORP

CYC 1

PI JP 2001300311 A 20011030 (200223)\* 5 B01J023-28 &lt;--

ADT JP 2001300311 A JP 2000-125534 20000426

PRAI JP 2000-125534 20000426

IC ICM B01J023-28

ICS B01J037-04; C01B019-00; C07C253-24; C07C255-08

ICA C07B061-00

AB JP2001300311 A UPAB: 20020411

NOVELTY - The composite metal oxide catalyst containing molybdenum, vanadium, niobium and tellurium is formed by calcining the precursor. The precursor has the diffraction peak in diffraction angle (2 theta ) of 22.1 plus or minus 0.5 deg. , in the X-ray diffraction by Cu-K alpha rays.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following: (i) Manufacture of carboxylic acid and/or nitrile, involves performing gaseous phase catalytic oxidation of hydrocarbon using composite metal oxide catalyst; (ii) Manufacture of acrylonitrile, involves performing gaseous phase contact reaction of propane, ammonia and oxygen, using composite metal oxide catalyst.

USE - For production of carboxylic acid and/or nitrile by gaseous phase catalytic oxidation of hydrocarbon, and for production of acrylonitrile by gaseous phase contact reaction of propane, ammonia and nitrogen (claimed).

ADVANTAGE - Composite metal oxide catalyst containing molybdenum, vanadium, niobium and tellurium, having improved catalytic activity, is provided. Carboxylic acid, nitrile and acrylonitrile are effectively manufactured, using improved composite metal oxide catalyst.

DESCRIPTION OF DRAWING(S) - The figure shows the powder X-ray diffraction figure of precursor.

Dwg.1/2

FS CPI

FA AB; GI; DCN

MC CPI: A01-D04; E10-A15B; E10-A15D; E10-C04G1A; E10-C04G1B; E10-C04H; E10-C04K; E31-G; N03-C; N03-D02; N04-A

TECH UPTX: 20020411

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Process: The solution containing precursor containing molybdenum, vanadium, niobium or tellurium is mixed with solution containing precursor containing all molybdenum, vanadium, niobium and tellurium. The solvent is removed from the mixed solution, to obtain a solid substance. The obtained solid is subjected to thermolysis at less than 400degreesC (preferably 200-400degreesC,) to obtain precursor. The obtained precursor is baked at 450-700degreesC, to obtain composite metal oxide catalyst. Preferred Composition: The composite metal oxide catalyst contains molybdenum/vanadium/niobium/tellurium in atomic ratio of 1/0.1-0.6/0.01-0.6/0.05-0.4.

ABEX UPTX: 20020411

EXAMPLE - (In kg) Para ammonium molybdate (7.09), ammonium meta-vanadate (1.41) and telluric acid (2.12) were added to 29.1 l of warm water, and dissolved. Silica-sol (5) containing 20 weight% (weight%) of silica was added to the obtained solution, to form reaction mixture. Niobium-ammonium oxalate (2.16) (mixture of (NH4, H)3 NbO4 (C2O4)3 and (NH4, H)2 Nb (OH) (C2O4)2) containing 20.5 weight% of niobium, 54 weight% of oxalic acid and 5.1 weight% of niobium, was added to 8.66 l of warm water. The obtained solution was added to the formed reaction mixture, and the temperature was set to 50degreesC. The obtained slurry was maintained at 20-50degreesC for 16 hrs. The slurry was then spray dried at inlet gas temperature of 220degreesC and outlet gas temperature of 160degreesC, and cooled, to obtain precursor having diffraction peak in diffraction angle (2theta) of 22.18degrees. The atomic ratio of molybdenum:vanadium:niobium:tellurium (Mo:V:Nb:Te) in the obtained

precursor was 1:0.3:0.12:0.23. The precursor was then baked for 2 hrs at 600degreesC under nitrogen atmosphere to obtain composite metal oxide catalyst containing Mo:V:Nb:Te in atomic ratio of 1:0.3:0.12:0.15. The mean particle diameter of catalyst was 50mm. The obtained catalyst had excellent catalytic activity, when used in production of acrylonitrile.

L29 ANSWER 8 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN  
AN 2002-174365 [23] WPIX  
DNC C2002-054154  
TI Manufacture of metal oxide catalyst used for production of acrylic acid, involves adding niobium or tantalum compound to reaction mixture of compounds of vanadium ion, molybdenum ion and antimony ion, and calcining.  
DC A41 E17  
PA (TOAG) TOA GOSEI CHEM IND LTD  
CYC 1  
PI JP 2001300310 A 20011030 (200223)\* 6 B01J023-28 <--  
ADT JP 2001300310 A JP 2000-117078 20000418  
PRAI JP 2000-117078 20000418  
IC ICM **B01J023-28**  
ICS **B01J037-04**; C07B061-00; C07C057-04  
ICA C07C051-225  
AB JP2001300310 A UPAB: 20020411  
NOVELTY - Vanadium ion (V5+) compound is continuously added to a reaction system containing molybdenum ion (Mo6+) compound and antimony ion (Sb3+) compound, and reacted in an aqueous medium at above 70 deg. C. Then, niobium compound or tantalum compound and optionally other metal compounds are added to the reaction mixture, mixed and calcined, to form a metal oxide catalyst.  
USE - For production of acrylic acid by gaseous phase catalytic oxidation of propane.  
ADVANTAGE - Acrylic acid is produced in high yield from propane, using the metal oxide catalyst.  
Dwg.0/0  
FS CPI  
FA AB; DCN  
MC CPI: A01-D08; E10-C04G; **E31-M**; E35-N; N03-C; N03-H;  
**N06-E01**; N07-C  
ABEX UPTX: 20020411  
EXAMPLE - (In g) Antimony trioxide (5.87) and ammonium molybdate (20.9) were added into a glass-made flask containing 30 ml of distilled water, in presence of nitrogen. The solution containing ammonium meta-vanadate (6.15), ammonium molybdate (10) and 140 ml of distilled water was supplied to a flask from a pump, and refluxed under boiling point temperature of water. Mixed gas of air/nitrogen containing 15% of oxygen was introduced at a flow rate of 100 ml/minute and cooled to room temperature, to obtain a blue colloid dispersion liquid. The aqueous solution containing 90 ml of distilled water, oxalic acid (13.15) and niobic acid (3.25), was added to the dispersion liquid, and stirred for 30 minutes. Then, ammonium nitrate (5) was added, and the obtained reaction mixture was concentrated by heating to 120degreesC. The obtained solid was then baked at 300degreesC for 5 hours and 600degreesC for 2 hours in presence of nitrogen, to obtain catalyst containing molybdenum/vanadium/antimony/niobium in an atomic ratio of 1/0.3/0.25/0.10. The obtained catalyst is mixed with cerite, ground, molded and used for acrylic acid production.  
L29 ANSWER 9 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN  
AN 2000-053269 [04] WPIX  
DNC C2000-013918  
TI Catalyst composition used for polymerizing monomers, e.g. in ethylene polymerization.

DC A17 E11 E12  
 IN BENHAM, E A; COLLINS, K S; HAWLEY, G R; JENSEN, M D; JOHNSON, M M; MARTIN, S J; MCDANIEL, M P; SMITH, J L; WITTNER, C E; MACDANIEL, M P  
 PA (PHIP) PHILLIPS PETROLEUM CO; (BENH-I) BENHAM E A; (COLL-I) COLLINS K S; (HAWL-I) HAWLEY G R; (JENS-I) JENSEN M D; (MART-I) MARTIN S J; (MCDA-I) MCDANIEL M P; (SMIT-I) SMITH J L; (WITT-I) WITTNER C E  
 CYC 86  
 PI WO 9960033 A1 19991125 (200004)\* EN 56 C08F004-642  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL  
 OA PT SD SE SL SZ UG ZW  
 W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB  
 GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU  
 LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR  
 TT UA UG US UZ VN YU ZA ZW  
 AU 9933618 A 19991206 (200019) C08F004-642  
 US 6107230 A 20000822 (200042) B01J031-00  
 BR 9910611 A 20010109 (200106) C08F004-642  
 NO 2000005845 A 20010118 (200112) C08F004-642  
 EP 1082355 A1 20010314 (200116) EN C08F004-642  
 R: BE DE ES FI FR GB IT NL  
 US 6300271 B1 20011009 (200162) B01J031-00  
 KR 2001043678 A 20010525 (200168) C08F004-642  
 CN 1307593 A 20010808 (200173) C08F004-642  
 US 6316553 B1 20011113 (200173) C08F002-14  
 HU 2001002282 A2 20011029 (200175) C08F004-642  
 US 2002007023 A1 20020117 (200212) C08F004-44  
 ZA 2000006699 A 20020424 (200237) 62 C08F000-00  
 JP 2002515522 W 20020528 (200238) 75 C08F004-642  
 MX 2000011174 A1 20030401 (200415) C08F010-00  
 US 6831141 B2 20041214 (200501) C08F004-642  
 RU 2251453 C2 20050510 (200532) B01J037-04 <--  
 ADT WO 9960033 A1 WO 1999-US6373 19990324; AU 9933618 A AU 1999-33618  
 19990324; US 6107230 A US 1998-80629 19980518; BR 9910611 A BR 1999-10611  
 19990324, WO 1999-US6373 19990324; NO 2000005845 A WO 1999-US6373  
 19990324, NO 2000-5845 20001117; EP 1082355 A1 EP 1999-914999 19990324, WO  
 1999-US6373 19990324; US 6300271 B1 US 1998-80619 19980518; KR 2001043678  
 A KR 2000-712883 20001116; CN 1307593 A CN 1999-807607 19990324; US  
 6316553 B1 Div ex US 1998-80629 19980518, US 2000-561166 20000428; HU  
 2001002282 A2 WO 1999-US6373 19990324, HU 2001-2282 19990324; US  
 2002007023 A1 Div ex US 1998-80619 19980518, US 2001-909152 20010719; ZA  
 2000006699 A ZA 2000-6699 20001116; JP 2002515522 W WO 1999-US6373  
 19990324, JP 2000-549651 19990324; MX 2000011174 A1 WO 1999-US6373  
 19990324, MX 2000-11174 20001114; US 6831141 B2 Div ex US 1998-80619  
 19980518, US 2001-909152 20010719; RU 2251453 C2 WO 1999-US6373 19990324,  
 RU 2000-131684 19990324  
 FDT AU 9933618 A Based on WO 9960033; BR 9910611 A Based on WO 9960033; EP  
 1082355 A1 Based on WO 9960033; US 6316553 B1 Div ex US 6107230; HU  
 2001002282 A2 Based on WO 9960033; US 2002007023 A1 Div ex US 6300271; JP  
 2002515522 W Based on WO 9960033; MX 2000011174 A1 Based on WO 9960033; US  
 6831141 B2 Div ex US 6300271; RU 2251453 C2 Based on WO 9960033  
 PRAI US 1998-80629 19980518; US 1998-80619 19980518;  
 US 2000-561166 20000428; US 2001-909152 20010719  
 IC ICM B01J031-00; B01J037-04; C08F000-00; C08F002-14; C08F004-44;  
 C08F004-642; C08F010-00  
 ICS B01J031-12; B01J031-14; C08F004-02  
 AB WO 9960033 A UPAB: 20011129  
 NOVELTY - Catalyst composition having greater activity when used in a  
 polymerization process, comprises:  
 (a) a treated solid oxide compound produced by contacting and  
 calcining a solid oxide with an electron-withdrawing anion source;

(b) a metallocene compound of group IVA; and organoaluminum compound.

DETAILED DESCRIPTION - Catalyst composition used for polymerizing monomers, comprises: an organometal compound of formula (I):

(X1)(X2)(X3)(X4)M1 (I)

M1 = Ti, Zr, Hf;

(X1) = Group OMC-I radical;

(X2) = Group OMCI or a group OMC-II radical;

(X3) and (X4) = Group OMC-II radical;

OMC-I = optionally substituted cyclopentadienyl, optionally substituted indenyl, optionally substituted fluorenyl, an organometallic, or H;

OMC-II = halide, aliphatic and/or cyclic, or organometallic group; and a treated solid oxide compound; and an organoaluminum compound of formula (II):

Al(X5)<sub>n</sub>(X6)<sub>3-n</sub> (II)

X5 = 1-20C hydrocarbyl;

X6 = halide, hydride, or an alkoxide;

n = 1-3.

The treated solid oxide compound is produced by contacting and calcining a solid oxide with an electron-withdrawing anion source compound to form a mixture.

INDEPENDENT CLAIMS are also included for:

(1) a process of producing a catalyst composition used for polymerizing monomers, comprising contacting an organometallic compound, a treated solid oxide compound, and an organoaluminum compound; and

(2) a process for polymerizing a monomer with the catalyst composition.

USE - The catalyst is used for polymerizing monomers, e.g. in polymerizing ethylene. The polymer can then be formed into a manufacture that is used to form a machine part (claimed), or into e.g. household containers and utensils, drums, fuel, tanks, pipes, geomembranes, and liners.

ADVANTAGE - The composition which uses treated solid oxide can polymerize ethylene into a polymer with a greater activity (greater than 100 or 2,000 (gP/(gS-hr))) than the composition that uses untreated Ketjen grade B alumina (claimed).

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A02-A06E; A02-A07A; A02-D; A04-G02A; E05-B02; E05-E02; E05-T;

E10-J02A2; E31-K01; E31-K07; E31-M; E31-P03; E31-Q04;

E34-A; E34-C02; E34-D03; E34-E; E35-A; E35-C; E35-D; E35-F; E35-H;

E35-K02; E35-L; E35-M; E35-N; E35-P; E35-Q; E35-S; E35-U02;

E35-V; E35-W

TECH UPTX: 20000124

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Composition: The organometal compound is bis(cyclopentadienyl)hafnium dichloride, bis(cyclopentadienyl)zirconium dichloride, (ethyl(indenyl)<sub>2</sub>) hafnium dichloride, (ethyl(indenyl)<sub>2</sub>) zirconium dichloride, (ethyl(tetrahydroindenyl)<sub>2</sub>) hafnium dichloride, (ethyl(tetrahydroindenyl)<sub>2</sub>) zirconium dichloride, bis(n-butylcyclopentadienyl) hafnium dichloride, bis(n-butylcyclopentadienyl) zirconium dichloride, ((dimethyl)(diindenyl)silane) zirconium dichloride, ((dimethyl)(diindenyl)silane) hafnium dichloride, ((dimethyl)(ditetrahydroindenyl)silane) zirconium dichloride, ((dimethyl)(di(2-methylindenyl)silane) zirconium dichloride, or bis(fluorenyl) zirconium dichloride. The organoaluminum compound is tri(methyl-, ethyl, propyl, butyl-, or isobutyl-)aluminum, diethylaluminum ethoxide, triisobutylaluminum hydride, or diethylaluminum chloride. The solid oxide

compound comprises oxygen and a group 2-15 elements, including the lanthanides and the actinides, particularly Al<sub>2</sub>O<sub>3</sub>, B<sub>2</sub>O<sub>3</sub>, BeO, Bi<sub>2</sub>O<sub>3</sub>, CdO, CoO<sub>4</sub>, Cr<sub>2</sub>O<sub>3</sub>, CuO, Fe<sub>2</sub>O<sub>3</sub>, Ga<sub>2</sub>O<sub>3</sub>, La<sub>2</sub>O<sub>3</sub>, Mn<sub>2</sub>O<sub>3</sub>, MoO<sub>3</sub>, NiO, P<sub>2</sub>O<sub>5</sub>, Sb<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub>, SnO<sub>2</sub>, SrO, ThO<sub>2</sub>, TiO<sub>2</sub>, V<sub>2</sub>O<sub>5</sub>, WO<sub>3</sub>, Y<sub>2</sub>O<sub>3</sub>, ZnO, ZrO<sub>2</sub>, or its combinations. The solid oxide compound is preferably treated with fluoride and/or chloride.

Preferred Process: The process of polymerizing a monomer using the catalyst composition is preferably under slurry polymerization conditions in a loop reactor in the presence of a diluent comprising isobutane.

ABEX

UPTX: 20000124

EXAMPLE - A 2.26 gram sample of Davison 952 silica calcined in dry air was impregnated with 3.4 ml of trifluoromethane sulfonic acid (85.7% pure). The procedure under nitrogen in a flask. This material was then mixed with 8.96 g of calcined Ketjen grade B alumina. The resulting solid material was 79.9 weight % alumina, 29.1 weight % silica. The mixture was heated to 193-230 degrees C for 3 hours in nitrogen to allow the trifluoro-methane sulfonic acid to evaporate and react with alumina. The solid oxide formed was then treated with chloride and fluoride, and was charged to a reactor, followed by 2 ml of a solution of 0.5 g of bis(n-butylcyclopentadienyl) zirconium dichloride in 100 ml of toluene, followed by 0.6 liter of isobutane liquid, then 2.0 ml of 1M triethyl aluminum as cocatalyst, followed by another 0.6 liters of isobutane and finally the ethylene. The activity was then determined by recording the ethylene flow into the reactor. The recorded activity of the sample was 6,318 gP/gS-hr.

L29 ANSWER 10 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 2000-041031 [04] WPIX

CR 2003-150205 [15]

DNC C2000-010854

TI Preparation of multi-metal oxide catalyst, suitable for oxidation of alkanes to unsaturated aldehydes or carboxylic acids.

DC A41 E19

IN HANSEN, M W; LIN, M; LINSSEN, M W

PA (ROHM) ROHM &amp; HAAS CO; (LINM-I) LIN M

CYC 33

PI EP 962253 A2 19991208 (200004)\* EN 14 B01J037-02 <--  
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI

CN 1236672 A 19991201 (200015) B01J037-00 &lt;--

JP 2000024501 A 20000125 (200016) 13 B01J027-057

BR 9901568 A 19991221 (200017) B01J037-04 &lt;--

CA 2271397 A1 19991121 (200018) EN B01J023-00

KR 99088461 A 19991227 (200059) B01J023-16

US 6180825 B1 20010130 (200108) C07C051-16

MX 9904691 A1 20000601 (200133) B01J023-54

US 2001049336 A1 20011206 (200203) B01J023-00

US 6514901 B1 20030204 (200313) B01J023-10

US 6514903 B2 20030204 (200313) B01J023-10

TW 486383 A 20020511 (200323) B01J023-00

EP 1260495 B1 20040811 (200452) EN B01J037-02 &lt;--

R: BE DE ES FR GB IT NL SE

ADT EP 962253 A2 EP 1999-303655 19990511; CN 1236672 A CN 1999-106467  
 19990512; JP 2000024501 A JP 1999-141802 19990521; BR 9901568 A BR  
 1999-1568 19990520; CA 2271397 A1 CA 1999-2271397 19990507; KR 99088461 A  
 KR 1999-18390 19990521; US 6180825 B1 Provisional US 1998-86211P 19980521,  
 US 1999-316007 19990521; MX 9904691 A1 MX 1999-4691 19990520; US  
 2001049336 A1 Provisional US 1998-86211P 19980521, Div ex US 1999-316007  
 19990521, US 1999-425671 19991022; US 6514901 B1 Provisional US  
 1998-86211P 19980521, Div ex US 1999-316007 19990521, US 1999-425670  
 19991022; US 6514903 B2 Provisional US 1998-86211P 19980521, Div ex US



1999-316007 19990521, US 1999-425671 19991022; TW 486383 A TW 1999-108383  
19990521; EP 1260495 B1 Div ex EP 1999-303655 19990511, EP 2002-9550  
19990511

FDT US 2001049336 A1 Div ex US 6180825; US 6514901 B1 Div ex US 6180825; US  
6514903 B2 Div ex US 6180825; EP 1260495 B1 Div ex EP 962253

PRAI US 1998-86211P 19980521; US 1999-316007 19990521;  
US 1999-425671 19991022; US 1999-425670 19991022

IC ICM B01J023-00; B01J023-10; B01J023-16; B01J023-54; B01J027-057;  
**B01J037-00; B01J037-02; B01J037-04;**  
C07C051-16

ICS B01J023-08; B01J023-20; B01J023-22; B01J023-26; **B01J023-28;**  
B01J023-42; B01J023-44; B01J023-63; B01J023-76; B01J023-887;  
B01J023-89; C07C045-33; C07C045-35; C07C047-055; C07C047-22;  
C07C051-215; C07C057-045; C07C057-05

ICA C07B061-00

AB EP 962253 A UPAB: 20040813

NOVELTY - Phase segregation during the preparation of a catalyst for the  
oxidation of alkanes to unsaturated aldehydes and carboxylic acids is  
minimized by forming a solution of metal compounds, removing the solvent,  
then calcining in an inert atmosphere.

DETAILED DESCRIPTION - A catalyst preparation method comprises:

(a) dissolving metal compounds, at least one of which is an  
oxygen-containing compound, in at least one solvent;  
(b) removing the solvent from the resulting solution;  
(c) calcining the resulting precursor at 350-850 deg. C under an  
inert atmosphere to form a catalyst of formula (I):

AaMmNnXxOo (I)

a is greater than 0.25 and less than 0.9;

m, n and x are each greater than 0.003 and less than 0.5;

o is dependent on the oxidation state of the other elements;

A = Mo, W, Fe, Nb, Ta, Zr, Ru or their mixture; M = V, Ce, Cr, or  
their mixture; N = Te, Bi, Sb, Se or their mixture; X = Nb, Ta, W, Ti, Al,  
Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pd, Pt, Sb, Bi, B, In, Ce or their  
mixture.

An INDEPENDENT CLAIM is also included for a catalyst of formula (I),  
where the catalyst has a surface area of 2-10 m<sup>2</sup>/g (determined by BET  
method).

USE - The catalyst is intended for use in converting alkanes to  
unsaturated aldehydes and carboxylic acids via a gas phase oxidation  
process (claimed).

ADVANTAGE - Phase segregation of the component elements is reduced  
and improvements are achieved in selectivity, conversion and yield.

Dwg.0/2

FS CPI

FA AB; DCN

MC CPI: A01-D08; E10-C04G; E10-C04H; E10-D01A; E10-D01B; E10-D01C;  
**E31-G; E31-M; E31-Q08; E35; N01-D01; N02-E02;**  
N02-F; N03

TECH UPTX: 20000124

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Solvent: in (a) the  
solvent is water.

Preferred Components: in (I)

A = Mo; M = V; N = Te; X = Nb; a is greater than 0.35 and less than  
0.87; m is greater than 0.045 and less than 0.37; n is greater than 0.020  
and less than 0.27; x is greater than 0.005 and less than 0.35.

Preferred Conditions: in (b) the solvent is removed by means of rotary  
evaporation, vacuum drying, air drying or freeze-drying; in (c) (I) is  
calcined at 400-700 (especially 500-640) degreesC in a non-flowing, inert  
atmosphere containing argon or nitrogen.

ABEX UPTX: 20000124

EXAMPLE - A sample of catalyst having the empirical formula  $\text{Mo}_{1.0}\text{V}_{0.3}\text{Te}_{0.23}\text{Nb}_{0.10}\text{-0.12}\text{O}_n$  was prepared by dissolving appropriate amounts of ammonium heptamolybdate tetrahydrate, ammonium metavanadate, telluric acid and niobium oxalate in water, removing the water from solution via a rotary evaporator, then calcining the catalyst precursor for 2 hours at 600 degreesC under argon in a non-flow environment. Granules of the catalyst product (10 g) were then packed into a U-tube reactor prior to gas phase oxidation of propane. The reaction was carried out at 390 degreesC using a propane/air/steam feed ratio of 1/15/14 and a space velocity of 1,200 per hour. Propane conversion, selectivity and yield (acrylic acid) indices of 69, 55 and 38% respectively were obtained as a result.

L29 ANSWER 11 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN  
 AN 1998-378926 [33] WPIX  
 DNC C1998-115101  
 TI Vanadium, antimony and tin oxide containing catalyst - prepared using tin oxide dispersion in tetraalkyl ammonium hydroxide solution and, useful for ammoxidation of 3-5C paraffins or olefins.  
 DC A41 E18 J04  
 IN BARTEK, J P; BRAZDIL, J F; BRAZDIL, A F  
 PA (STAH) STANDARD OIL CO OHIO; (STAH) STANDARD OIL CO  
 CYC 34  
 PI EP 853977 A1 19980722 (199833)\* EN 7 B01J023-22  
 R: AL AT BE CH DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO  
 SE SI  
 JP 10225634 A 19980825 (199844) 8 B01J023-22  
 ZA 9800258 A 19980930 (199844) 20 B01J000-00  
 US 5854172 A 19981229 (199908) B01J023-00  
 CN 1206627 A 19990203 (199924) B01J023-22  
 BR 9800349 A 19990525 (199926) B01J037-04 <--  
 US 5972833 A 19991026 (199952) B01J023-00  
 KR 98070558 A 19981026 (199953) B01J023-62  
 US 6087524 A 20000711 (200037) C07C253-00  
 MX 9800508 A1 19990101 (200051) B01J023-18  
 SG 77153 A1 20001219 (200106) B01J023-22  
 RO 116253 B1 20001229 (200117) B01J023-18  
 TW 425304 A 20010311 (200143) B01J023-00  
 US 6372908 B1 20020416 (200232) C07D213-84  
 MX 204942 B 20011025 (200279) B01J023-18  
 RU 2195999 C2 20030110 (200319) B01J037-04 <--  
 CN 1389457 A 20030108 (200334) C07C255-08  
 EP 853977 B1 20031008 (200370) EN B01J023-22  
 R: DE ES GB IT NL  
 DE 69818718 E 20031113 (200382) B01J023-22  
 ES 2209062 T3 20040616 (200442) B01J023-22  
 CN 1104947 C 20030409 (200538) B01J023-22  
 ADT EP 853977 A1 EP 1998-300250 19980114; JP 10225634 A JP 1998-6883 19980116;  
 ZA 9800258 A ZA 1998-258 19980113; US 5854172 A US 1997-785543 19970117;  
 CN 1206627 A CN 1998-105606 19980117; BR 9800349 A BR 1998-349 19980116;  
 US 5972833 A Div ex US 1997-785543 19970117, US 1998-151463 19981109; KR  
 98070558 A KR 1998-1133 19980116; US 6087524 A Cont of US 1997-785543  
 19970117, Div ex US 1998-151463 19981109, US 1999-293452 19990416; MX  
 9800508 A1 MX 1998-508 19980116; SG 77153 A1 SG 1998-60 19980106; RO  
 116253 B1 RO 1998-65 19980115; TW 425304 A TW 1998-100547 19980116; US  
 6372908 B1 Cont of US 1997-785543 19970117, Div ex US 1998-151463  
 19981109, Div ex US 1999-293452 19990416, US 2000-567674 20000509; MX  
 204942 B MX 1998-508 19980116; RU 2195999 C2 RU 1998-101417 19980116; CN  
 1389457 A Div ex CN 1998-105606 19980117, CN 2002-105536 19980117; EP  
 853977 B1 EP 1998-300250 19980114; DE 69818718 E DE 1998-618718 19980114,

EP 1998-300250 19980114; ES 2209062 T3 EP 1998-300250 19980114; CN 1104947  
 C CN 1998-105606 19980117

FDT US 5972833 A Div ex US 5854172; US 6087524 A Cont of US 5854172, Div ex US  
 972833; US 6372908 B1 Cont of US 854172, Div ex US 5972833, Div ex US  
 087524; DE 69818718 E Based on EP 853977; ES 2209062 T3 Based on EP 853977

PRAI US 1997-785543 19970117; US 1998-151463 19981109;  
 US 1999-293452 19990416; US 2000-567674 20000509

IC ICM B01J000-00; B01J023-00; B01J023-18; B01J023-22; B01J023-62;  
**B01J037-04**; C07C253-00; C07C255-08; C07D213-84

ICS B01J021-08; B01J023-14; B01J023-16; B01J023-20; B01J023-24;  
 B01J023-26; **B01J023-28**; B01J023-30; B01J023-34;  
 B01J023-847; B01J027-057; C07C051-265; C07C051-54; C07C063-15;  
 C07C253-24; C07C253-26; C07C253-28; C07C255-51; C07D213-78;  
 C07D253-26; C07D253-28

ICA C07B061-00

AB EP 853977 A UPAB: 19980819

A catalyst (I) containing vanadium, antimony and tin in the oxide state is prepared by making an aqueous slurry of a mixture (II) of compounds of the desired elements followed by drying and calcining the mixture to form active catalyst (I). (II) is a solution comprising  $\text{SnO}_2 \cdot x\text{H}_2\text{O}$  (where x at least 0) dispersed in a tetraalkyl ammonium hydroxide of formula  $(\text{C}_n\text{H}_{2n+14}\text{NOH})$  (1). Also claimed is a process for making an alpha, beta-unsaturated mononitrile, preferably acrylonitrile or methacrylonitrile by the catalytic reaction in the vapour phase of propane or isobutane with oxygen and ammonia in the presence of a catalyst (I) of formula  $\text{VSbmAaDdOx}$  (2). The mole ratio of paraffin to  $\text{NH}_3$  is 2.5-16 and the mole ratio of paraffin to  $\text{O}_2$  is 1-10. n = 1-5; A = Ti and/or Sn where Sn is always present D = Li, Mg, Ca, Sr, Ba, Co, Fe, Cr, Ga, Ni, Zn, Ge, Nb, Zr, Mo, W, Cu, Te, Ta, Se, Bi, Ce, In, As, B, Al and/or Mn. m = 0.5 - 10; a = 0 - 10; d = 0-10; and x is determined by the oxidation state of the cations present.

USE - The catalyst (I) is useful for the ammoxidation 3-5C paraffins or olefins to the corresponding alpha, beta-unsaturated mononitrile. (I) is useful for the ammoxidation of methylpyridine, m-xylene or the oxidation of o-xylene to cyanopyridine, isophthalonitrile or phthalic anhydride respectively.

ADVANTAGE - The catalyst (I) is prepared in a cost effective manner by use of a tin oxide dispersion in a tetraalkyl ammonium hydroxide solution.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D04; A01-E11; E06-A02A; E10-A15A; E10-A15B; E10-A15D;  
**E31-M**; E31-Q08; J04-E04; N01; N02; N03

L29 ANSWER 12 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 1994-001089 [01] WPIX

DNC C1994-000433

TI Multi-metal oxide compsn., production - used in catalytic gas phase oxidation of organic cpds., especially unsatd. acid or aldehyde production, contg fine domains of bi metal oxide in matrix of different compsn..

DC A41 E16 J04

IN DOERFLINGER, W; MARTAN, H; NEUMANN, H; PETERSEN, H

PA (NEUM-I) NEUMANN H; (BADI) BASF AG

CYC 11

PI EP 575897 A1 19931229 (199401)\* GE 8 B01J023-88  
 R: BE DE ES FR GB NL  
 DE 4220859 A1 19940105 (199402) 6 C01G001-02

CA 2096081 A 19931226 (199411) C01B013-14  
 CZ 9301053 A3 19940216 (199414) C01G001-02  
 JP 06071177 A 19940315 (199415) 6 B01J023-88  
 US 5364825 A 19941115 (199445) 7 B01J023-31  
 CN 1087290 A 19940601 (199530) B01J023-00  
 US 5449821 A 19950912 (199542) 5 C07C051-16  
 EP 575897 B1 19960306 (199614) GE 18 B01J023-88  
 R: BE DE ES FR GB NL  
 DE 59301767 G 19960411 (199620) B01J023-88  
 ES 2083799 T3 19960416 (199623) B01J023-88  
 CZ 284491 B6 19981216 (199904) B01J023-88  
 CN 1048652 C 20000126 (200464) B01J023-88  
 ADT EP 575897 A1 EP 1993-109741 19930618; DE 4220859 A1 DE 1992-4220859  
 19920625; CA 2096081 A CA 1993-2096081 19930512; CZ 9301053 A3 CZ  
 1993-1053 19930602; JP 06071177 A JP 1993-149012 19930621; US 5364825 A US  
 1993-64428 19930521; CN 1087290 A CN 1993-107619 19930625; US 5449821 A  
 Div ex US 1993-64428 19930521, US 1994-268504 19940630; EP 575897 B1 EP  
 1993-109741 19930618; DE 59301767 G DE 1993-501767 19930618, EP  
 1993-109741 19930618; ES 2083799 T3 EP 1993-109741 19930618; CZ 284491 B6  
 CZ 1993-1053 19930602; CN 1048652 C CN 1993-107619 19930625  
 FDT US 5449821 A Div ex US 5364825; DE 59301767 G Based on EP 575897; ES  
 2083799 T3 Based on EP 575897; CZ 284491 B6 Previous Publ. CZ 9301053  
 PRAI DE 1992-4220859 19920625  
 REP DE 3338380; EP 835; FR 2534904  
 IC ICM B01J023-00; B01J023-31; B01J023-88; C01B013-14; C01G001-02;  
 C07C051-16  
 ICS B01J021-00; B01J021-02; B01J021-08; **B01J023-28**; B01J023-30;  
 B01J023-84; B01J023-85; B01J023-887; B01J027-057; B01J027-18;  
 B01J027-192; B01J027-199; **B01J037-04**; C01B033-00;  
 C01G033-00; C07B033-00; C07C045-32; C07C047-21; C07C047-22;  
 C07C051-21; C07C057-03; C07C057-04; C07C057-05; C07C253-26;  
 C07C255-08  
 AB EP 575897 A UPAB: 19940217  
 Multimetal oxide compsn. (I) is of the formula:  
 (X1aX2bOx)p(X3cX4dX5eX6fX7gX2hOy)q (IA)  
 X1 is Bi, Te, Sb, Sn and/or Cu; X2 is Mo and/or W; X3 is an alkali  
 metal, Tl and/or Sm; X4 is an alkaline earth metal, Ni, Co, Cu, Mn, Zn,  
 Sn, Cd and/or Hg; X5 is Fe, Cr, Ce and/or V; X6 is P, As, B and/or Sb; X7  
 is a lanthanide metal, Ti, Zr, Nb, Ta, Re, Ru, Rh, Ag, Au, Al, Ga, In, Si,  
 Ge, Pb, Th and/or U; a is 0.01-8; b is 0.1-30; c is 0-4; d and e are 0-20;  
 f is 0-6; g is 0-15; h is 8-16; x and y are nos. determined by the valency  
 and frequency of the various elements; the p/q ratio is 0.1-10.  
 (I) contains 3D domains with a maximum dia. of 1-25 microns and the  
 compsn. X1aX2bOx (IB), surrounded by material of different compsn..  
 Pref. X1 is Bi; X1aX2bO is Bi2W2O9.  
 USE/ADVANTAGE - (I) is used as catalyst for gas phase catalytic  
 oxidation of organic cpds., pref. for the production of 3-6C alpha,beta-  
 monoethylenically unsatd. aldehydes and/or carboxylic acids from alkanes,  
 alkanols, alkenes and/or alkenals with the same number of C atoms (claimed).  
 It has higher activity and selectivity than usual.  
 In an example, 50kg solution of Bi(NO3)3 in aqueous HNO3 (11 (weight)%  
 Bi, 6.4%  
 HNO3) were treated with 6.7kg H2WO4 and stirred 1 hr. at 50 deg.C. The  
 suspension was spray dried and calcined 2 hrs. at 750 deg.C. The mix oxide  
 (Bi2W2O9 slightly contaminated with WO3) was pulverised and classified to  
 particle dia. fractions of (A) 0.1-1, (B) 1-5, (C) 5-10, (D) 10-15, (E)  
 15-20, (F) 20-25, (G) 30-50, (H) 90-120 microns, fractions (A, G, H) being  
 controls. each fraction was mixed with 1% SiO2 (number average dia. 28nm),  
 giving starting material (1). A solution of 85.5kg ammonium molybdate in 240  
 l water was treated with a solution of 11.9kg Co(NO3)2 and 5.7kg Fe(NO3)3 in

80 l water and 7.8kg aqueous 20% colloidal SiO<sub>2</sub> and 377g aqueous 48% KOH solution.

The suspension was stirred for 3 hrs., then spray dried, giving starting material (2). (1) And (2) were mixed in the amts. required to give the compsn. (Bi<sub>2</sub>W<sub>2</sub>O<sub>9</sub>)<sub>0.5</sub>Mo<sub>12</sub>Co<sub>5</sub>Fe<sub>2.5</sub>Si<sub>1.5</sub>K<sub>0.05</sub>O<sub>x</sub>, pressed to hollow cylinders (5mm long, 5mm outside dia., 1.5mm wall thickness) and calcined 6 hrs. in air at 470 deg.C. The prods. contained domains of Bi<sub>2</sub>W<sub>2</sub>O<sub>9</sub> with about the same maximum dia. as the (1) fraction used, in a matrix of different compsn..

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D05; A01-D08; E10-C04H; E10-D01B; **E31-G**; E31-K04; E31-L; E35; J04-E04; N02; N03; N04-B

ABEQ US 5364825 A UPAB: 19950102

A compsn. of formula (I) is claimed. (X<sub>1</sub>aX<sub>2</sub>bO<sub>x</sub>)p(X<sub>3</sub>cX<sub>4</sub>dX<sub>5</sub>eX<sub>6</sub>fX<sub>7</sub>gX<sub>2</sub>hO<sub>y</sub>)q (I) in which X<sub>1</sub> is Bi, Te, Sb, Sn and/or Cu; X<sub>2</sub> is Mo and/or W; X<sub>3</sub> is alkali metal, Th and/or Sm; X<sub>4</sub> is alkaline earth metal, Ni, Co, Cu, Mn, Zn, Sn, Cd, and/or Hg; X<sub>5</sub> is Fe, Cr, Ce and/or V; X<sub>6</sub> is P, As, B and/or Sb; X<sub>7</sub> is a rare-earth metal, Ti, Zr, Nb, Ta, Re, Ru, Rh, Ag, Au, Al, Ga, In, Si etc.; a is 0.01-8; b is 0.1-30; c is 0-4; d is 0-20; e is 0-20; f is 0-6; g is 0-15; h is 8-16; x and y are determined by the valency and frequency of the elements in formula (I) other than O, and p and q are numbers whose ratio p/q is 0.1-10, contg. three-dimensional regions with a chemical formula X<sub>1</sub>aX<sub>2</sub>bO<sub>x</sub> and a local environment, in which the regions are delimited from the local environment due to the chemical formula of the regions which is different from the local environment, in which at least 50% of the regions have a dia. of 1-25 microns.

USE/ADVANTAGE - The compsns. have increased activity and selectivity as catalysts for the gas-phase catalytic oxidn. of organic cpds., in partic. for the prepn. of unsatd. aldehydes and carboxylic acids.

Dwg.0/0

ABEQ US 5449821 A UPAB: 19951026

Gas-phase catalytic oxidn. of (3-6C) alkane, alkanol, alkene or alkenal comprises (a) contacting starting material with a catalyst of formula \$ (X<sub>1</sub>aX<sub>2</sub>bO<sub>x</sub>)p (X<sub>3</sub>cX<sub>4</sub>dX<sub>5</sub>eX<sub>6</sub>f X<sub>7</sub>gX<sub>2</sub>hO<sub>y</sub>)q \$ contg. 3-dimensional regions with formula X<sub>1</sub>aX<sub>2</sub>bO<sub>x</sub> and a local environment. Regions are delimited from the local environment due to formula of the regions which is different, such that 50% or more of the regions has max. dia. 1-25 microns.

X<sub>1</sub> is Be, Te, Sb, Sn and/or Cu; X<sub>2</sub> and M and/or W; X<sub>3</sub> is alkali metal, Th and/or Sm; X<sub>4</sub> is alkaline earth metal, Ni, Co, Cu; Mn, Zn, Sn, Cd and/or Hg; X<sub>5</sub> is Fe, Cr, Ce and/or V; X<sub>6</sub> is P, As, B and/or Sb; X<sub>7</sub> is a rare earth metal, Ti, Zr, Ni, Tl, Re, Ru, Rh, Ag, Au, Al, Ga, In, Si, Ge, Pb, Th and/or U; a is 0.01-8; b is 0.1-30; c is 0-4; d and e are each 0-20; f is 0-6; g is 0-15; h is 8-16; x and y are determined w.r.t. frequency and valency of corresp. elements; and ratio p/q is 0.1-10.

USE - In prodn. of olefinically-unsatd. aldehydes and/or carboxylic acids and corresp. nitriles.

Dwg.0/0

ABEQ EP 575897 B UPAB: 19960405

A composition of the formula 1 (X<sub>1</sub>aX<sub>2</sub>bO<sub>x</sub>)p(X<sub>3</sub>cX<sub>4</sub>dX<sub>5</sub>eX<sub>6</sub>fX<sub>7</sub>gX<sub>2</sub>hO<sub>y</sub>)q (I), where X<sub>1</sub> is bismuth, tellurium, antimony, tin and/or copper, X<sub>2</sub> is molybdenum and/or tungsten; X<sub>3</sub> is an alkali metal, thallium and/or samarium; X<sub>4</sub> is an alkaline earth metal, nickel, cobalt, copper manganese, zinc tin, cadmium and/or mercury, X<sub>5</sub> is iron, chromium, cerium and/or vanadium, X<sub>6</sub> is phosphorus, arsenic, boron and/or antimony, X<sub>7</sub> is a rare earth metal, titanium, zirconium, niobium, tantalum, rhenium, ruthenium, rhodium, silver, gold, aluminium gallium, indium, silicon, germanium, lead, thiorium and/or uranium, a is from 0.01 to 8, b is from 0.1 to 30, c is from 0 to 4, d is from 0 to 20, e is from 0 to 2, f is from 0 to 6, g is from 0 to 6, g is from 0 to 15, h is from 8 to 16, x and y are numbers

determined by the valency and frequency of the elements in I or ther other oxygen and p and q are numbers whose ratio p/q is form 0.1 to 10, contg. three dimensional regions, with a chemical composition  $Z1aX2bOx$  which are delaminated from their local environment due to their chemical composition which is different from their local environment, and whose maximum diameter is from 1 to 25 micro-m.

Dwg.0/0

L29 ANSWER 13 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 1993-120540 [15] WPIX

DNC C1993-053212

TI Maleic anhydride synthesis catalyst preparation - by heating aqueous slurry containing

molybdenum cpd. antimony cpd. and inorganic reducing agent, adding water, evaporating, drying and sintering.

DC A41 E13

PA (JAPG) NIPPON ZEON KK

CYC 1

PI JP 05057188 A 19930309 (199315)\* 7 B01J023-28 <--

ADT JP 05057188 A JP 1991-248487 19910903

PRAI JP 1991-248487 19910903

IC ICM **B01J023-28**

ICS B01J023-88; B01J027-188; **B01J037-04**; C07D307-60

ICA C07B061-00

AB JP 05057188 A UPAB: 19931115

Catalyst containing Mo and Sb used in the synthesis of maleic anhydride by vapour phase oxidation of butadiene is prepared by concentrating aqueous slurry containing a Mo cpd., Sb cpd., and an inorganic reducing agent to paste by heating, adding water to obtain a suspension, evaporating the aqueous slurry solution to dryness, drying further and sintering.

ADVANTAGE - The catalyst obtd. has high activity.

In an example, to 1000 pts. ion-exchanged water, 300 pts. of ammonium molybdate and 50 pts. of antimony trioxide were added to obtain a suspension. The suspension was heated and when it reached 50 deg. C, 50 pts. of hydrazine hydrate was added to obtd. aqueous slurry solution The

aqueous

slurry solution was heated to 70-100 deg. C and concentrated to a paste with a solid content of 55% (process A). 700 parts of ion-exchanged water at 20 deg. C was added to the paste to obtain an aqueous slurry solution at a

temperature of

up to 40 deg. C and with a solid content of up to 15% (process B). After repeating the processes A and B 3 times, the aqueous slurry solution was evaporated to dryness and dried in an oven at 110 deg. C for 12 hours. The solid was sieved to obtain 8-10 mesh uniform grains and sintered in tube furnace at 450 deg. C for 3 hours in an air current which had been adjusted to have an apparent contacting time with the solid of 1 sec

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: A01-D08; A01-E12; E07-A01; **E31-M**; E32-A03; **E35-Q**;

**N03-D**; N03-H; N05-D; **N06-E**

L29 ANSWER 14 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN

AN 1984-141772 [23] WPIX

DNC C1984-059786

TI Regeneration of fluidised iron-antimony oxide catalysts - by adding volatile molybdenum component supported on further catalyst during catalyst use.

DC A41 E19 J04

IN KIYOMIYA, Y; NAKAMURA, T; NAKAMURA, Y; SASAKI, Y; YAMIGUCHI, M

PA (NITT) NITTO CHEM IND CO LTD  
 CYC 7  
 PI EP 109775 A 19840530 (198423)\* EN 37  
 R: AT DE GB IT NL  
 JP 59076544 A 19840501 (198423)  
 EP 109775 B 19860827 (198635) EN  
 R: AT DE GB IT NL  
 DE 3365703 G 19861002 (198641)  
 US 4757038 A 19880712 (198830)  
 JP 02056939 B 19901203 (199101)  
 ADT EP 109775 A EP 1983-306457 19831025; JP 59076544 A JP 1982-186746  
 19821026; EP 109775 B EP 1983-306457 19831025; US 4757038 A US 1987-52226  
 19870515; JP 02056939 B JP 1982-186746 19821026  
 PRAI JP 1982-186746 19821026  
 REP EP 57041; GB 2088738; GB 814073; GB 814075; US 3882159; US 3988359; US  
 4208303  
 IC B01J023-94; B01J027-28; **B01J037-04**; C01C003-02; C07B061-00;  
 C07C120-14; C07C121-32; C07C253-26; C07C255-08  
 AB EP 109775 A UPAB: 19970909  
 Metallic oxide catalyst comprising (I) Fe, (II) Sb, (III) V, Mo and/or W  
 and (IV) Te, opt. with other components, which has become deactivated by  
 use for oxidation, ammoxidn. or oxidative dehydrogenation of organic cpd(s)  
 in fluidised bed reactors, is regenerated by adding a second catalyst  
 comprising the above components (of same or different empirical formula)  
 supporting a Mo component which is volatile or capable of forming a  
 volatile component under reaction conditions.  
 The Mo component pref. increases the Mo content of the whole catalyst  
 mixture by 0.01-2 weight%. It is pref. molybdenum trioxide, molybdic acid,  
 ammonium molybdate, ammonium paramolybdate or phosphomolybdic acid.  
 Regeneration can be carried out without interrupting the reaction; it  
 does not require additional equipment for introduction of a vapourised  
 regenerator and does not result in dilution of the catalyst.  
 Dwg.0/0  
 FS CPI  
 FA AB  
 MC CPI: A01-D04; E10-A15B; **E31-G**; E35; J04-E05; N02-A01; N03-C;  
**N03-D**; N03-H; N04-A  
 L29 ANSWER 15 OF 15 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN  
 AN 1979-81992B [45] WPIX  
 TI Catalyst for oxidation of propylene - contains chromium, molybdenum,  
 tellurium and phosphorus oxide(s) and is used in acrylic acid and acrolein  
 mfr..  
 DC A41 E17 J04  
 IN KUZNETSOV, V A; ROZHKOVA, E V; YAREMENKO, E I  
 PA (AUPH-R) AS UKR PHYS CHEM  
 CYC 1  
 PI SU 648258 A 19790228 (197945)\*  
 PRAI SU 1977-2503527 19770701  
 IC B01J023-16; **B01J037-04**; C07B003-00  
 AB SU 648258 A UPAB: 19930901  
 The catalyst is prepared by mixing chromium oxide (IV) with aqueous solns. of  
 ammonium para-molybdate (V), telluric acid(VI) and ammonium dihydrogen  
 phosphate(VII) followed by calcination at 625 degrees -650 degrees C.  
 Calcination below 625 degrees C decreases the selectivity of the catalyst  
 and above 650 degrees C its activity is reduced.  
 The catalyst prepared as described above is more active. Used in the  
 oxidation of propylene(I), the yield of acrylic acid (II) is <=67.1% and the  
 total yield of (II) and acrolein(III) is 83.9%.  
 FS CPI

FA AB  
MC CPI: A01-D05; A01-D08; E10-C04G; E10-D01A; E31-G; E31-K01;  
E35-P; E35-Q; J04-E04; N03-D; N04-A; N04-B

=>

jan delaval - 19 july 2005